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## **Function Flow Analysis and Comparison of Doctrinal and Applied Operations Planning Process**

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## Abstract

This work compared the Canadian Forces (CF) Operational Planning Process (OPP) as it is applied by a Staff at the Brigade level in a realistic scenario with the OPP as it is prescribed in current doctrine and taught within the Land Force (Bruyn, Lamoureux and Vokac, 2004). To establish how the OPP is applied in an operational context, the planning Staff of 1 CMBG was observed during EX VIRTUAL RAM at Canadian Forces Base (CFB) Edmonton from Jan 21-25, 2005. Previous work has documented the OPP as it is outlined in doctrine and taught within the Land Force.

Overall, it was observed that not all the functions of the OPP as described in doctrine were performed during the exercise, and there was a great deal of 'looping' back and forth between the functions, mainly at the lower levels of the function decomposition. The abbreviation and repetition of lower level functions, seemingly in groupings, suggests that these functions are strongly linked and performed as more of a continual process than discrete steps. As well, it was observed that the planning process is indeed "command-driven" as the Commander makes the majority of critical decisions and provides significant guidance and direction to the remaining critical decisions handled by the planning Staff.

It was concluded that the 1 CMBG planning Staff followed a step-by-step analytical decision making approach for higher level OPP functions, but more intuitive processes to perform specific, individual functions. It appeared that the input of various staff to the OPP was intuitive, or at least based on his/her own estimate of the situation, compiled from various sources. These results suggest that, in general, application of the OPP at the Brigade level may be a hybrid of analytic and intuitive decision making.

## Résumé

Dans le cadre de ce travail, nous avons comparé le processus de planification opérationnelle (PPO) des Forces canadiennes (FC), tel qu'il est appliqué par le personnel au niveau de la brigade dans un scénario réaliste, avec le PPO, tel que prévu par la doctrine actuelle et enseigné par la Force terrestre (Bruyn, Lamoureux et Vokac, 2004). Pour établir de quelle façon le PPO est mis en œuvre dans un contexte opérationnel, nous avons observé le personnel de planification du 1<sup>er</sup> Groupe-brigade mécanisé du Canada (1 GBMC) au cours de l'exercice *Virtual Ram* à la Base des Forces canadiennes Edmonton, du 21 au 25 janvier 2005. Des travaux antérieurs ont documenté le PPO tel que décrit dans la doctrine et enseigné par la Force terrestre.

Dans l'ensemble, nous avons remarqué que les fonctions du PPO, telles que décrites dans la doctrine, n'étaient pas toutes effectuées au cours de l'exercice et qu'il y avait beaucoup de va-et-vient, de « boucles » entre les fonctions, principalement aux niveaux inférieurs de la fonction décomposée. L'abrègement et la répétition des fonctions inférieures, vraisemblablement en groupes, donnent à penser que ces fonctions sont étroitement liées et effectuées de façon continue plutôt que par étapes. Nous avons également noté que le processus de planification relève du « commandement », étant donné que le commandant prend la majorité des décisions critiques et qu'il oriente et dirige de façon importante le reste des décisions critiques prises par le personnel de planification.

Nous avons conclu que le personnel de planification du 1 GBMC suivait une démarche décisionnelle analytique, étape par étape, pour les fonctions du PPO de niveau supérieur alors que les fonctions individuelles particulières étaient effectuées selon un processus plus intuitif. Il apparaît que l'apport des différents membres du personnel du PPO était d'un ordre plus intuitif, ou du moins fondé sur une évaluation personnelle de la situation, compilée à partir de différentes sources. Ces résultats donnent à penser qu'en général, la mise en œuvre du PPO au niveau de la brigade est un hybride de prises de décision intuitives et analytiques.

## Executive Summary

This work represents the third project in a series investigating the Canadian Forces (CF) Operational Planning Process (OPP) as it exists in Land Force doctrine, is taught in the Land Force, and is applied in operational settings. This is in support of a larger project, Project Minerva, focused on re-examining Command and Control (C2), specifically the CFOPP, in the Land Force in light of the implementation of digitized C2 systems. The CFOPP represents an analytic decision making process in which 1) multiple solutions to the problem must be evaluated and the best selected, and 2) evaluation of solution alternatives must be performed through exhaustive factor-by-factor comparison. Research in the cognitive sciences has suggested that a large portion of human decision making is conducted intuitively; i.e. by less formal, non-analytic processes. This suggests that there may be a mismatch between the OPP as laid out in doctrine and taught at training and education institutions within the CF, and the planning process as practiced by command teams in more operational settings, especially at the Brigade level and below.

This work compared the Canadian Forces (CF) Operational Planning Process (OPP) as it is applied by a Staff at the Brigade level in a realistic scenario with the OPP as it is prescribed in current doctrine and taught within the Land Force (Bruyn, Lamoureux and Vokac, 2004). To establish how the OPP is applied in an operational context, the planning Staff of 1 CMBG was observed during EX VIRTUAL RAM at Canadian Forces Base (CFB) Edmonton from Jan 21-25, 2005. Previous work has documented the OPP as it is outlined in doctrine and taught within the Land Force.

In order to document the OPP as it is applied in a realistic operational setting, the project team observed the 1 Canadian Mechanized Brigade Group (CMBG) Staff during EX VIRTUAL RAM at Canadian Forces Base (CFB) Edmonton from Jan 21-25, 2005. Specifically, the team observed and documented all functions performed by the planning Staff during several planning cycles.

The data collected was used to map the OPP, as it was applied to three partial and one complete planning cycle, onto doctrinal OPP function flow diagrams created by Bruyn et al. (2004). This graphical mapping depicts the sequence in which functions were performed including “loops” or repeated functions. Overall, two major observations were made about the application of the OPP: not all the functions of the OPP as described in doctrine were performed; and there was a great deal of ‘looping’ back and forth between the functions, mainly lower level functions. The abbreviation and repetition of lower level functions, seemingly in groupings, suggests that these functions are strongly linked and performed as more of a continual process than discrete steps. As well, it was observed that the planning process is indeed “command-driven” as the Commander is involved in the majority of the critical decisions made by the planning Staff.

It was also observed that there exist several constraints that may affect the way in which the OPP is applied including time, mission type, the transference of a plan from Plans to Ops, and the need for a step-up Bde HQ to assume control from the main Bde HQ when the main Bde HQ relocates. With respect to time, it was concluded that the OPP at Brigade-level, with the possible exception of initial planning, will almost always be time constrained. As such, the process will be abbreviated and requires specific planning direction from the commander.

Overall, it was concluded that the 1 CMBG planning Staff followed a step-by-step analytical decision making approach for higher level OPP functions, but more intuitive processes to perform specific, individual functions. It appeared that the input of various staff to the OPP was intuitive, or at least based on his/her own estimate of the situation, compiled from various sources. These



results suggest that, in general, application of the OPP at the Brigade level may be a hybrid of analytic and intuitive decision making.

The finding that the OPP as applied at the Brigade level appears to be a hybrid of analytic and intuitive decision making may have several ramifications. First, it suggests that effort should be directed toward developing an abridged OPP that reflects a hybrid analytical and intuitive decision making style. It follows that this abridged OPP should be subsequently reflected in CF doctrine. Likewise, training and education for the Brigade's Staff and at the Brigade should not only include instruction on analytical decision making (i.e. the OPP), but also exploit intuitive decision making. Finally, attempts should be made to support the more mechanical and mundane tasks, such as production of orders, leaving the Staff to focus on novel problem solving and decision making.

## Sommaire administratif

Ce travail est le troisième d'une série de projets d'enquête sur le processus de planification opérationnelle (PPO) des Forces canadiennes (FC), tel qu'il existe dans la doctrine de la Force terrestre, qu'il est enseigné par la Force terrestre et mis en œuvre dans les contextes opérationnels, en vue d'appuyer un projet plus vaste, le projet Minerve. Celui-ci est axé sur un nouvel examen du commandement et du contrôle (C2), en particulier du PPOFC dans la Force terrestre, compte tenu de la mise en place des systèmes C2 numérisés. Le PPOFC représente un processus de prise de décision analytique au cours duquel 1) plusieurs solutions au problème doivent être évaluées et la meilleure solution choisie et 2) l'évaluation de solution de rechange doit être effectuée par une comparaison exhaustive critère par critère. Les recherches en sciences cognitives indiquent qu'une grande partie de la prise de décision humaine est intuitive, c'est-à-dire qu'elle s'effectue selon un processus moins analytique, moins formel. Cela suppose qu'il peut y avoir une discordance entre le PPO tel que décrit dans la doctrine et enseigné dans les établissements d'éducation et d'instruction des FC et le processus de planification tel que mis en pratique par l'équipe de commandement dans les contextes plus opérationnels, en particulier à la brigade et aux niveaux inférieurs.

Au cours de ce travail, nous avons comparé le processus de planification opérationnelle (PPO) des Forces canadiennes (FC), tel qu'il est appliqué par le personnel au niveau de la brigade dans un scénario réaliste, avec le PPO, tel que prévu par la doctrine actuelle et enseigné par la Force terrestre (Bruyn, Lamoureux et Vokac, 2004). Pour établir de quelle façon le PPO est appliqué dans un contexte opérationnel, nous avons observé le personnel de planification du 1<sup>er</sup> Groupe-brigade mécanisé du Canada (1 GBMC) au cours de l'exercice *Virtual Ram* tenu à la Base des Forces canadiennes Edmonton, du 21 au 25 janvier 2005. Des travaux antérieurs ont documenté le PPO tel que décrit dans la doctrine et enseigné par la Force terrestre.

Afin de documenter le PPO, tel que mis en œuvre dans un contexte opérationnel réaliste, l'équipe du projet a observé le personnel du 1<sup>er</sup> Groupe-brigade mécanisé du Canada (1 GBMC) au cours de l'exercice *Virtual Ram* à la Base des Forces canadiennes Edmonton, du 21 au 25 janvier 2005. Plus précisément, l'équipe a observé et documenté toutes les fonctions effectuées par le personnel de planification au cours de plusieurs cycles de planification.

Les données recueillies ont servi à cartographier le PPO, tel qu'il a été appliqué au cycle de planification complet et aux trois cycles partiels, sur les schémas fonctionnels du PPO créés par Bruyn et coll. (2004). Cette représentation cartographique illustre la séquence selon laquelle les fonctions sont effectuées, y compris les « boucles » ou fonctions répétées. Dans l'ensemble, nous avons remarqué deux faits importants à l'égard de la mise en œuvre du PPO : les fonctions du PPO, telles que décrites dans la doctrine, n'étaient pas toutes effectuées au cours de l'exercice. Il y avait beaucoup de va-et-vient, de « boucles » entre les fonctions, principalement aux niveaux inférieurs de la fonction décomposée. L'abrègement et la répétition des fonctions inférieures, vraisemblablement en groupes, donnent à penser que ces fonctions sont étroitement liées et effectuées de façon continue plutôt que par étapes. Nous avons également noté que le processus de planification relève en effet du « commandement », étant donné que le commandant prend la majorité des décisions critiques et qu'il oriente et dirige de façon importante le reste des décisions critiques prises par le personnel de planification.

Nous avons aussi remarqué que plusieurs contraintes pouvaient avoir des conséquences sur la façon dont le PPO est mis en œuvre, comme le temps, le type de mission, le transfert d'un plan de la

planification aux opérations et la nécessité d'un QG de brigade de relais à partir du QG de brigade principal lorsque celui-ci déménage. Pour ce qui est du temps, nous avons conclu que le PPO au niveau de la brigade, à l'exception possible de la planification initiale, est presque toujours contraint par le temps. Comme tel, le processus est abrégé et exige que le commandant oriente la planification de façon particulière.

Dans l'ensemble, nous avons conclu que le personnel de planification du 1 GBMC suivait une démarche décisionnelle analytique, étape par étape, pour les fonctions du PPO de niveau supérieur alors que les fonctions individuelles particulières étaient effectuées selon un processus plus intuitif. Il apparaît que l'apport des différents membres du personnel du PPO est d'un ordre plus intuitif, ou du moins fondé sur une évaluation personnelle de la situation, compilée à partir de différentes sources. Ces résultats donnent à penser qu'en général, la mise en œuvre du PPO au niveau de la brigade peut être un hybride de prises de décision intuitives et analytiques.

Les constatations selon lesquelles le PPO, mis en œuvre au niveau de la brigade, paraît être un hybride de prises de décisions intuitives et analytiques peut avoir plusieurs ramifications. Tout d'abord, ceci suggère que nous devons orienter les efforts vers le développement d'un PPO abrégé, qui tiendrait compte de ce style de prise de décision. Il s'ensuit que la doctrine des FC devrait ultérieurement tenir compte de ce PPO abrégé. De la même façon, l'éducation et l'instruction du personnel de la brigade et à la brigade devraient comprendre non seulement des directives sur la prise de décision analytique (c.-à-d., le PPO), mais aussi exploiter la prise de décision intuitive. Enfin, nous devrions tenter d'appuyer les tâches plus monotones et mécaniques, comme la production des ordres, afin de permettre au personnel de se concentrer sur la résolution de nouveaux problèmes et sur la prise de décision.



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# 1. Introduction

## 1.1. Background

The intention of Project Minerva is to re-examine Land Force Command and Control (C2) in light of the implementation of digitized C2 systems. This will be done within the context of the Athene Tactical System. The Land Force wants to develop new procedures that capitalize on the strengths of digitization.

Project Minerva will focus on the Canadian Forces Operations Planning Process (CFOPP, alternatively referred to as ‘the OPP’ in this report), which is the prescribed Canadian Forces (CF) method of operational planning for a mission. Although the CFOPP was developed without any explicit linkage to psychological theories of problem solving and decision making, it is consistent with what has been termed analytic decision making. This was found in work by Bryant, Webb, and McCann (2003). In particular, the OPP affirms two major premises of analytic decision making; 1) multiple solutions to the problem must be evaluated and the best selected, and 2) evaluation of solution alternatives must be performed through exhaustive factor-by-factor comparison.

Research in the cognitive sciences has suggested that a large portion of human decision making is conducted intuitively; i.e. by less formal, non-analytic processes. This suggests that there may be a mismatch between the OPP as laid out in doctrine and taught at training and education institutions within the CF, and the planning process as practiced by command teams in more operational settings. In particular, command teams at the Brigade level and below may engage in the Estimate, a more intuitive process than the doctrinal OPP. An intuitive planning process may be preferable to an analytic process as intuitive reasoning has been demonstrated to require less information and consume less time than strictly analytic processes. Even where analytic processes have advantages, innate tendencies of humans to think intuitively may reduce the effectiveness of an analytic procedure like the OPP when put into practice. These arguments for intuitive procedures, however, may not apply when decision making is considered in the context of highly complex, dynamic problem scenarios involving many different planning participants.

The current work represents the second phase of this project and compares the application of the OPP as conducted by representative command teams in realistic scenarios with the OPP as it is currently laid out in doctrine. The first phase of the project focused on a function analysis of the OPP as laid out in doctrine and taught at training and education institutions within the CF (Bruyn, Lamoureux & Vokac, 2004). The goal of this first phase was to document the doctrinal OPP and describe the ‘typical’ scenarios to which it would be applied (e.g. problems, contexts, constraints). The results of the first phase formed the basis for the current work which compares OPP as applied in an operational setting with the OPP in doctrine. A secondary goal of the current work is to examine procedural and technological means to better support operational planning.

The project has been contracted to Humansystems Incorporated® (Humansystems®, HSI®) under contract W7711-0047907/001/TOR. The Scientific Authority (SA) for this work is Dr. David Bryant.



## 1.2. Purpose

The objective of this project is to perform a function analysis of the OPP (as defined in Bruyn, Lamoureux & Vokac, 2004) as applied under operational conditions at the Brigade level. Specifically, this project will describe the way in which the OPP is applied and compare it with the OPP as outlined in CF doctrine. Differences between applied and doctrinal OPP will be identified along with factors that may constrain the application of the OPP.

## 1.3. Tasks

The following tasks, taken directly from the Statement of Work (SOW), were performed as part of the current work:

1. Developed a plan for function flow observation and analysis of the OPP as applied in a realistic operational exercise;
2. Conducted an observation of how the OPP is applied in a realistic setting, based on the plan developed in #1;
3. Conducted a function flow analysis based on data recorded in #2;
4. Compared doctrinal OPP with applied OPP, and,
5. Identified decision requirements, strengths and weaknesses of applied OPP.

Additionally, the SA asked the project team to record what graphical tools Staff used to communicate and align mental models, and the manner (if any) that the planning process was 'command-driven'. These and additional observations of interest are included in this report.

## 1.4. Approach Taken in this Report

The OPP, as practiced by the Land Force, is a comprehensive process involving a great number of personnel across a number of levels in the Land Force hierarchy. Each level in the Land Force hierarchy has its own processes and terminology that fit within the 'umbrella' of the next higher level in the hierarchy. This arrangement has the potential to lead to some confusion when, for instance, related processes are given different names at different levels of the Land Force hierarchy, but the relationship is not made explicit. This report begins by outlining a number of terms and relationships that were observed by Bruyn, Lamoureux & Vokac (2004) and have potential to confuse the reader. The report then describes the method and findings of an observation of a Brigade level exercise in which the OPP was applied, including a function analysis of the applied OPP. The OPP, as applied by the Planning Staff at the Brigade level, is then compared to the doctrinal OPP described in Bruyn, Lamoureux and Vokac (2004). Finally, a number of general observations are made regarding the communication of intent (mental models), the nature of command, etc., before conclusions and recommendations are made (with a focus on procedural and technological means to better support operational planning).

## 2. Definition of Terms

All of the following sections are discussed in greater detail in Bruyn, Lamoureux and Vokac (2004).

### Staff Assignments

The function flow analyses described later in this report attempt to define responsibilities for different tasks, information provision, etc. To assist the reader, descriptions of the different roles performed by members of a General Staff are provided:

**Commander** – a member of the CF with the authority to direct, co-ordinate, and control military forces.

**Staff** – personnel who assist in planning and preparing the orders Commanders wish to issue, and personnel who assist Commanders in monitoring and controlling the actions taken by subordinate units in executing those orders. The prefix G is used when referring to land staff, A refers to air staff, N refers to maritime staff, and J designates joint staff (those supporting more than one environment). General Staff assist the Commander in meeting the operational responsibilities of command.

The General Staff consists of:

**G1** – responsible for personnel;

**G2** – responsible for intelligence;

**G3** – responsible for operations (at Brigade level, G3 may be responsible for plans);

**G4** – responsible for logistics;

**G5** – responsible for plans (at Brigade level, however, G3 may be responsible for plans, as observed during this study, and G5 becomes responsible for civil/military relations (i.e. G9));

**G6** – responsible for communications;

**G7** – responsible for training;

**G8** – responsible for financial management; and

**G9** – responsible for civil/military relations.

### Land Force (Infantry) Structure and Levels of Planning

There are potentially eight levels (including 'Army') in the structure of an Army (this structure is independent of ranks and takes an infantry perspective). They are:

Corps	The Canadian Land Force is not large enough at this time to have a Corps
Division (Div)	The Canadian Land Force is not large enough at this time to have a Division (although the three independent Brigades could be amalgamated into a Division)
Brigade (Bde)	Is typically comprised of three infantry battalions and one armoured Regiment, one Field Regiment, and one Engineer Regiment with organic combat support and combat service support units
Battalion (Bn)	Is comprised of one Head Quarters (HQ) (support elements come from signals platoon in combat support Company), three rifle Companies, one combat support

Company (reconnaissance [recce] platoon, signals platoon, anti-armour platoon) and one admin Company (transport platoon, maintenance platoon, medical platoon and supply platoon); there are nine regular force infantry Bns and three armoured Regiments (Reg) in Canada

Company (Coy) Is comprised of three Platoons and one specialised Platoon

Platoon (Pl) Is comprised of three Sections

Section (Sect) Is comprised of eight or ten soldiers (dismounted and mounted infantry respectively); may also be referred to as a Detachment (Det)

The different levels in the Land Force engage in different types of planning: Strategic, Operational and Tactical. The relationship between the various levels of planning and structure of the Land Force (including NDHQ) is shown in Figure 1.



**Figure 1: Relationship between Land Force structure and levels of planning.**

From a purely doctrinal sense all planning through Division level is considered tactical. While a Brigade may employ the OPP in a recognizable form, it would rarely do so at the “operational” level (current exceptions to this include Operation Athena in Afghanistan). A number of different opinions about this doctrinal point exist, most driven by the attempt to apply operational-level doctrinal terminology to a small standing force. This point should be borne in mind when considering the OPP.

### **The Estimate, OPP and Battle Procedure**

The Estimate, OPP and Battle Procedure are all planning procedures employed within the Land Force, although at different levels. The processes are somewhat overlapping, especially at the Bde

level. This section includes a description of and makes a distinction between these three planning processes.

The Estimate refers to the process by which an individual (e.g. commander) performs a mission analysis, evaluates all of the factors relevant to the mission, considers potential courses of action and makes a decision that meets the requirements of the mission. An Estimate that includes all of these steps and is iterative, such that it continues as the situation changes, is referred to as a Formal Estimate or Estimate of the Situation. The Combat Estimate, on the other hand, is an abbreviated form of the Estimate of the Situation made when time is short or information is incomplete, and is usually completed in mental or note form by an individual rather than a group.

The OPP comprises the steps of the Estimate but includes three additional steps: initiation (or receipt of tasks), plan development and plan review. Also, as the Estimate is normally performed by an individual (though staff can support the process at, e.g., Battalion level), the OPP is performed collectively by a commander and his Planning Staff at higher levels of command (i.e. Corps, Div and sometimes Bde). Each member of G Staff has responsibility for estimates pertaining to different factors, and these are brought together by the Commander. Even with the OPP, the Commander and his Staff will perform estimates, often to a great level of detail.

Battle Procedure is the process, typically used at the Bde level and lower, by which a commander receives his orders, makes his reconnaissance and plan, issues his orders, prepares and deploys his troops and executes his mission. Battle Procedure has traditionally been the source of decision-making in the Land Force at the lower tactical levels, but now applies to Commanders at all levels. Battle Procedure is similar to the OPP in that there is a cycle of consideration and planning, although the end goal of the Battle Procedure is an action (e.g. execution) rather than a plan of action. This is reflected in the four stages of Battle Procedure: Direction, Consideration, Decision, and Execution. At the lower levels of command, however, Battle Procedure has been refined over time into a drill consisting of 15 steps which expand upon the four stages listed above.

## Application Contexts

The CF OPP manual lists two categories of CF operations:

- Routine Operations; and
- Contingency Operations

Routine operations are those for which a given Capability Component (CC) has been specifically tasked, organised and equipped. Routine operations use existing Command and Control (C2) relationships and there may be no requirement to use joint terminology. Routine operations normally reflect tasks from the Canadian Joint Task List (CJTL) that have been assigned to the CC in the Defence Plan. Doctrine for routine operations is normally environmental in nature. There are eight main tasks in the CJTL, each with associated subtasks corresponding to strategic, operational and tactical levels:

- Command;
- Information and Intelligence;
- Conduct of Operations;
- Mobility;
- Force Protection;



- Sustain;
- Force Generation; and
- Corporate Strategy and Policy

Contingency operations can be conducted either domestically or internationally. If an operation does not clearly fall into the routine category, then it is contingency and a grouping specifically tailored to the operation is generated. Any grouping created for a contingency operation is called a Task Force (TF). If more than one service is involved in the operation it is called a Joint Task Force (JTF).

The following are examples of specific planning scenarios for which commanders may employ the OPP, categorized according to whether they are international or domestic, whether they are routine or contingency and, if they are routine, to what CJTL task they correspond.

Examples would include:

- Hurricane relief support (Domestic Contingency as a TF/JTF);
- Red River Floods (Domestic Contingency as a TF/JTF);
- Ice Storm Relief (Domestic Contingency as a TF/JTF);
- Firefighting (Domestic Contingency as a TF/JTF);
- Operation Apollo (International Contingency as a JTF);
- Toronto Snow Relief (Domestic Contingency as a TF); and
- Manitoba Floods (Domestic Contingency as a TF/JTF).



### 3. Method

This project commenced with a start-up meeting with the SA. At this meeting, a common understanding of the objectives and focus of the project was confirmed. It was determined that in order to accurately compare doctrinal OPP with the OPP as it is applied in an operational context, Army personnel would need to be observed utilising the OPP in a realistic setting. As such, the SA arranged for HSI<sup>®</sup> personnel to observe the 1 Canadian Mechanized Brigade Group (CMBG) Staff during EX VIRTUAL RAM at Canadian Forces Base (CFB) Edmonton from Jan 21-25, 2005.

The exercise scenario for EX VIRTUAL RAM assumed an operational environment with multiple threats and multiple civilian agencies with the vast majority neutral to the military mission. For exercise play, the flank units, higher headquarters, and various civilian agencies were simulated by player cells at "HICON," the HQs controlling the exercise (see Figure 2), in this case Land Forces Western Area (LFWA). The Primary Training Audience (PTA) was 1 CMBG operating in a field configuration. The Secondary Training Audience (STA) consisted of subordinate units (battalions and regiments) operating indoors in modified command post configurations. The exercise was simulation supported within the framework of an exercise control matrix approved by LFWA.



**Figure 2: Battalion Headquarters for Subordinate Unit (in the Drill Hall)**

### **3.1. Data Collection Plan**

Understanding that the quality of the final analysis is highly dependent on the quality and quantity of the information collected during the project, a detailed data collection plan was created. The plan took into account specific data that needed to be collected, where and who it should be collected from, and certain areas of focus for data collection.

Those actually observing the process and collecting data were referred to as Observers. Those acting out the exercise and being observed were referred to as Staff. Not all Staff were selected for observation. Based on the previous work it is felt that the Commander, G3 Plans and G2 Plans hold the pivotal roles in the OPP and were thus chosen as the best candidates for observation and data collection.

There needed to be at least a 1:1 ratio of Observers to Staff. This allows each Observer to have no more than 1 Staff to shadow (i.e. G3 Plans, G2 Plans or the Commander). It was then the responsibility of each Observer to follow and document all actions of their Staff. The plan outlined activities the Observers needed to do before, during and after EX VIRTUAL RAM.

One important aspect was the actions and thoughts of the Commander. The Commander position is the only position mentioned in the goals for the project. One of the three goals is to better understand how the commander leads the Operational Planning Process. For this reason, it was recommended that the person with the best understanding of the OPP and of 'Command' be assigned the role of observing the Commander. This ensured that the best possible information pertaining to the Commander was collected and that the nuances of the Commander's behaviour were not missed.

The following data collection plan was not a formal process meant to be followed step by step. It simply outlined specific issues that needed to be addressed and/or remembered during the data collection process.

#### **Prior to the Planning Exercise**

There were 3 activities that the Observers did before beginning data collection in the OPP exercise: familiarise themselves with the exercise 'mission', take time to orient themselves in the exercise, and decide specifically what aspects to focus on.

First, each Observer received a full mission briefing to clarify what the OPP exercise would entail. Observers were familiarized with exercise events, event timelines, and terminology (including abbreviations and slang terms).

Also, before the exercise, Observers allowed themselves adequate time to become oriented to the layout of the planning cell and the Staff who are in it. Observers were especially aware of the Staff that other Observers are focusing on so they could reference them appropriately.

As well, before the exercise, the Observers needed to be aware of specific aspects of importance. One aspect of importance already noted, was the role of the Commander. Observers took careful notice of communications between their Staff and the Commander. Other aspects included informal planning aids, informal communications, and elements of past experience that were informing the Staff's decisions.

Finally, timelines were important. Timelines can serve as a universal mark of where each Staff is at different parts of the exercise. A standardized timing was agreed upon by all Observers before the exercise, and the time was noted as often as possible. This assisted in later determining what

different Staffs were doing at the same time. Any further data/observation aspects of importance identified by one Observer were made known to all the Observers. Further details about data that was recorded can be found in the following section.

### **During the Planning Exercise**

There were many things that Observers needed to do during the OPP exercise. First, the Observers observed all six steps of the OPP.

Observers spent as much time as possible with their designated Staff. The OPP process moved quickly, all actors worked quickly, and information arrived from all directions. In order to accurately and adequately capture the activities of the Staff, each observer dedicated their efforts to the observation of one Staff; they did not attempt to broaden their view of the exercise or gather data on another Staff. It was important to shadow the individual Staff very closely in order that no feature relevant to the application of the OPP is missed.

Essentially, the observer documented (to the best of his or her ability) everything his or her Staff saw, heard, and touched. Attention was also paid to all decisions and thought processes of all Staff. The following data was collected:

- Function – the doctrinal OPP function being performed by the Staff;
- Trigger/Stimulus – the event or action that initiated Staff action/thoughts;
- Goals –the goal(s) of the Staff for the function currently being performed;
- Information Requirements – the information needed by the Staff to perform the current function;
- Key Decisions –the important decisions made concerning the current function?
- Outputs – the product (physical, mental, or communicated) created by the Staff;
- Lead Staff – the identity of the Staff member leading the current function, if any;
- Support Staff – the identities of other Staff members assisting in the performance of the current function; and
- Comments – any other information pertaining to the current function.

As previously discussed, timelines were included where possible. Other Staff members with whom the Staff member communicated were noted, along with the form and content of communication.

Copies of paper and electronic correspondence that are produced and received by the Staff member were collected. This included both formal and ‘doodle’ documentation. The significance and timeliness of each document was captured by the Observer. Copies of all briefings presented to the Commander were collected.

Pertinent information that was missing (or that the Staff was not made aware of) was noted. Constraints placed on the Staff that limited their decisions, thoughts or actions were also noted.

### **After the Planning Exercise**

After the planning exercise was complete, each Observer performed a full examination of their notes. This was done within 24 hours of the OPP exercise and ensured the notes portrayed an

accurate representation of the exercise from the perspective of the Staff being observed. The timing of this final examination was very important. The longer time passed, the more difficult it was to reconstruct what actually occurred during the exercise and in what context. The examination ensured legibility, completeness of notes, and also served as a chance to add any last minute notes that may be necessary for understanding. When questioning whether to include or not include a piece of information, it was always included. Clearly, it was a great deal easier to delete information presented than to remember information forgotten. Finally, this review provided Observers with a chance to align their observations chronologically according to the standardized timeline.

It was also necessary to validate the output of the data collection. Previously, the function flow analysis of the doctrinal OPP was validated by a retired LCol who taught the OPP at the Canadian Forces College, and an active LCol responsible for the OPP at the Land Force Command and Staff College. For this work, the analysis was validated by those Staff observed for data collection (the G3 Plans). This required that the completed function flows were taken to the Staff involved in the data collection for their consideration. A project team member then gathered their comments on the accuracy of the function flow. Once this validation was complete, the function flow was used to compare with the doctrinal OPP function flow.

### **Data Collection Issues**

During EX VIRTUAL RAM three observers were used. This led to some minor disagreements in the observations regarding what steps were seen and what was happening during the exercise. These inconsistencies were addressed during validation and by the SME resident in the observer team. It is felt that, for the most part, these inconsistencies stem from the unfamiliarity of the team with the operational scenario and the operational environment. Ultimately, EX VIRTUAL RAM was a training exercise for 1 CMBG, not a data collection opportunity for the observers, so the primary objective of the 1 CMBG Staff was to conduct the exercise, not provide a verbal protocol for the observers. 1 CMBG Staff provided ample assistance to the observers.

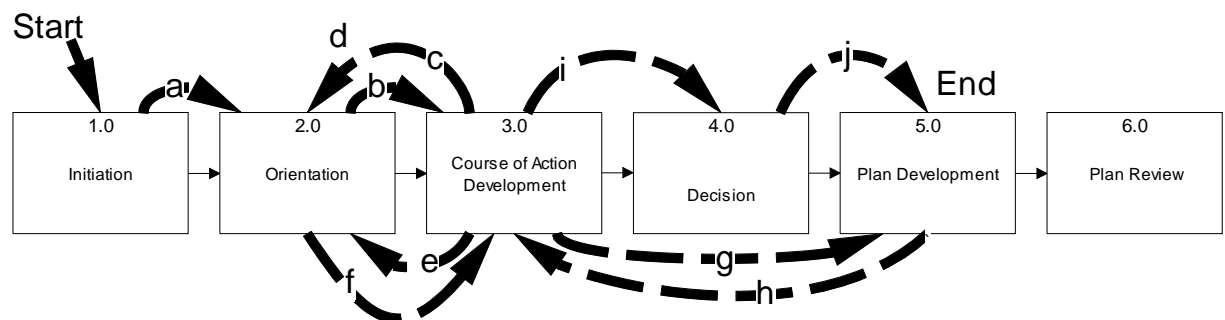
Related to these observations about data collection is that it was sometimes difficult to know exactly which function was being observed. This was due to a few factors: functions were not always performed in order; certain functions were abbreviated depending on commander's guidance; certain elements (like informal briefings) while important in terms of planning, are not accounted for in the doctrinal OPP; and other elements that were products of the planning process were not directly mentioned in doctrinal OPP (e.g. synch matrix, groupings and tasking matrix). The synchronization matrix and grouping and tasking matrix are products used to support an OPLAN or OP O. The synchronization matrix could be included under 3.7.5.10 with further refinement occurring during 5.6.6 and 6.3. The grouping and tasking matrix could fall within 3.4.5, 3.4.8, 3.7.5.10, and 5.4. Further refinement can occur in 5.6.6, 5.8, 6.2, 6.3, 6.5, and 6.6.

## **3.2. Function Flow Diagrams**

The function flow diagram is a frequently used function analysis technique (Beevis et al., 1994). Function analysis involves the identification of the key functions and their interrelationships that are required to achieve system objectives. Functions represent high level descriptions of logical units of behaviour of a system that must be performed, rather than describing the engineering or human sub-systems that actually implement the functions. Function analysis consists of a

hierarchical analysis and description that starts at the upper levels and progresses to lower levels of decomposition.

Bruyn, Lamoureux and Vokac (2004) conducted a function flow analysis of the OPP as it is outlined in doctrine, resulting in function flow diagrams and a tabular task analysis of the doctrinal OPP. The current work compares the doctrinal OPP to the OPP as it was applied during an observation of 1 CMBG at EX VIRTUAL RAM. That is, OPP functions conducted by the Planning Staff of 1 CMBG during EX VIRTUAL RAM were mapped to the function flow diagrams of the doctrinal OPP. The mapping of the applied OPP onto the doctrinal OPP function flow diagrams clearly show the differences between the OPP as outlined in doctrine and as it is applied in an operational exercise. This mapping is shown for all planning cycles in Annex A, and an example is provided in Figure 3. This graphical rendition of the function flow makes it easy to identify where the Staff repeated functions.



**Figure 3: Example of function flow, showing actual flow between doctrinal functions**

Annex B contains a listing of functions that was used to develop the function flows for planning cycle 2, as well as function listings for cycles 1, 3 and 4. It was decided to include a listing in order that the reader could consider the detail of the sequence of functions, rather than the flow.

### 3.3. Overviews

Annex C presents four ‘overview’ pages. Each page represents one of the planning ‘cycles’ observed during EX VIRTUAL RAM and depicts all the functions outlined in the doctrinal OPP. Functions in this overview are shaded if they were observed during that planning cycle. This provides the user with a quick appreciation of what OPP functions were conducted (although not how frequently they were conducted).



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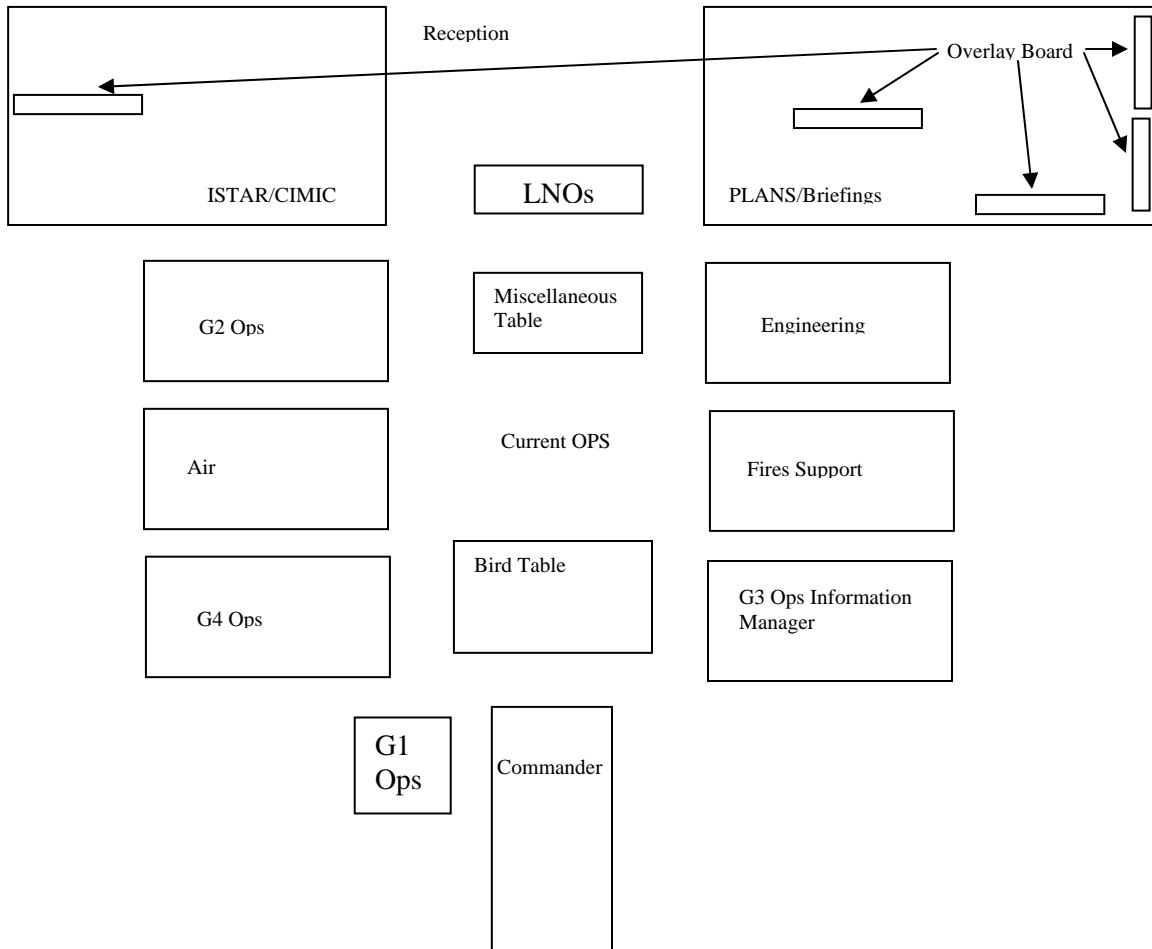
## 4. Findings

### 4.1. Context

The scenario used for EX VIRTUAL RAM assumed an operational environment with multiple threats and multiple civilian agencies with the vast majority neutral to the military mission. For exercise play only, the flanks were simulated by a player cell at "HICON," the HQs controlling the exercise. 1 CMBG headquarters was a number of linked tents constructed in the middle of the parade square (see Figure 4) in the configuration illustrated in Figure 5. Seven trucks were backed on to the Current Ops cell to provide working areas for the various groups that were represented. The whole area was heated with oil-fired space heaters (forced air) and powered by diesel generators. Satellite and radio communications were used to make contact with the subordinate units and higher command.



**Figure 4: 1 CMBG Headquarters**



**Figure 5: Configuration of 1 CMBG Headquarters**

## 4.2. Description of Planning Cycles Observed

During the period of observation at EX VIRTUAL RAM, the planning cell conducted 3 partial planning cycles and 1 complete planning cycle (Step 1 to Step 6 of the OPP). A general description of the contextual events surrounding each planning cycle is outlined in Table 1.



**Table 1: Planning cycle, contextual events and amount of planning cycle observed**

Planning Cycle	Contextual Events	Parts of Planning Cycle Observed
1 (Phase 2 of Op)	Cdr was not present for initiation or orientation steps so minimal guidance provided to Staff  Short timeline for planning process before back brief to DIV HQ	Observation started at Step 4 of OPP (i.e. Decision) and finished at Step 6.
2 (Phase 3 of Op)	Commander performed mission analysis and presented 1 COA to Planning Staff; told Staff to "Staff check" the COA and modify as required rather than develop other COAs	Observed entire planning cycle
3 (Phase 3B of Op)	Plan reassigned to Ops for final part of planning. Select members of Planning Staff (e.g. G2 Plans) reassigned to Ops	Observation started at Step 1 and was transferred to Ops at Step 3
4 (Phase 4 of Op)	Orders from Higher Command received very late in process so planning based on anticipation of orders	Observation finished at Step 3

In summary, only a partial planning cycle was observed for cycles #1, 3 and 4, while an entire planning cycle was observed for cycle #2. Therefore data analysis, while addressing all 4 planning cycles, will focus primarily on planning cycle #2 as it has the most complete data set and therefore facilitates the most meaningful comparison.

### 4.3. Comparison of doctrinal and applied OPP

The OPP from doctrine and practice are compared using two methods. The first method of comparing doctrinal and applied OPP is based on function flow diagrams developed by Bruyn Lamoureux & Vokac (2004) that illustrate the doctrinal OPP. The next step was to show, using arrows, the order in which these functions were performed (if, in fact, they were performed) as observed during EX VIRTUAL RAM. This data representation method (included in Annex A) is useful in illustrating the order in which OPP functions are performed in an applied setting compared to the step-by-step method in which the OPP is outlined in doctrine. This comparison method was conducted for the second planning cycle only as this was the only planning cycle that was observed in its entirety. Further, for this analysis, functions are defined to the second level only (i.e. 1.1, 2.1, 3.1, etc) to facilitate comparison. Information to the lowest level of decomposition is listed in Annex B.

The second method involves mapping the OPP functions performed in practice to a complete list of doctrinal functions as outlined in Bruyn, Lamoureux & Vokac (2004). This representational method (included in Annex C) is helpful at illustrating the exact OPP functions used in practice as compared to what is outlined in doctrine and taught at the Land Forces Command and Staff



College. In this comparison analysis, the functions are defined to the lowest level (e.g. 3.2.1.10 *Analyze Risk* rather than the higher level 3.2.1 *Analyze Factors and Deductions*).

Overall, two observations were made about the application of the OPP: not all the functions of the OPP as described in doctrine were performed; and there was a great deal of ‘looping’ back and forth between the functions. Possible reasons for this are discussed in the following sections.

## 4.4. Functions performed

### *Planning Cycle #1*

Observation of the planning cell at EX VIRTUAL RAM commenced when the planning team was in Step 4 (Decision) of the first planning cycle. The *Decision Brief* was the first step in the OPP that the project team observed. Following the decision brief, specific sub-functions within Step 5 (Plan Development) and Step 6 (Plan Review) were observed.

In terms of order in which the functions were performed, the Planning Staff followed the OPP Steps 4 through 6 in sequence. Within each step, however, functions were not necessarily performed in the order in which they are outlined in the doctrinal OPP. That is, certain functions and sub-functions within the *Decision*, *Plan Development* and *Plan Review* steps of the OPP were abbreviated or aggregated into higher level functions. Furthermore, there is evidence that the planning team actually moved “backward” in the process from 5.9 (*Issue Final Plan*) to 5.4 (*Review Plan*). It was suggested that this backward stepping occurred because wargaming was not conducted in the first pass during COA validation in Step 3 (COA Development). In fact, during the decision brief, the G-3 Plans, after presenting two friendly COAs, moved directly to the Staff recommendation. This was done without providing the Commander with a detailed comparison of the COAs which was likely due, in large part, to not having conducted COA wargaming.

Refer to Annex B for an illustration of all functions and sub-functions that were performed, and the order in which they were performed. Refer to Annex C for an overview comparison of the functions observed during planning cycle # 1 and the functions outlined in the doctrinal OPP.

### *Planning Cycle #2*

The second planning cycle performed by the Planning Staff was observed from *Initiation* (Step 1) to the issuing of a plan in *Plan Development* (Step 5). This planning cycle was particularly interesting in that the Commander initiated the planning process by providing a “rough” friendly COA to the Planning Staff and giving the Staff the duty to “Staff check” and refine his COA. That is, the Commander gave a very detailed initial guidance (OPP Step 1.6) to the planning cell based on a very detailed initial assessment<sup>1</sup> (OPP Step 1.5). As a result, the Planning Staff started the planning process at *Orientation* and followed an abbreviated version of the OPP to *Plan Development*.

The observers assumed that the Commander had performed OPP Steps 1.4 and 1.5, leading to issuing his guidance (1.6). Subsequent to this, the Planning Staff performed orientation and mission analysis (2.0 and 2.1) before moving quickly to the development of the COA provided by the Commander (Step 3.4 of the OPP). There was a loop back to a consideration of the Commander’s planning guidance, before some staff analysis and COA validation (of the COA

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<sup>1</sup> We assume that the Commander did a thorough initial assessment, although we did not observe this specifically

provided by the Commander). Then the Staff looped back to orientation and mission analysis, before reviewing the Commander's guidance again, conducting staff analysis, developing the enemy's COAs and their own (Commander's) COA, conducting more staff analysis and then doing COA validation of the Commander's COA. Then the staff entered a period of plan preparation where they attempted to formalise the plan on overlays and in writing. This necessitated the revision of the Commander's intent and approval for the CONOPS from a higher authority. Once the plan was formalised, some COA validation (of the Commander's COA) took place again, before the plan was presented to the Commander in a decision brief. This led to a final revision of the Commander's intent before the Staff issued the final plan.

It should be noted that throughout this entire process, the plans Staff only ever evolved and developed the original friendly COA provided by the Commander. Development of enemy COAs during this period were restricted to those enemy actions most likely to affect the Commander's COA. This consideration would lead to minor alterations or additions to the Commander's COA to ensure that the enemy COA did not disrupt the friendly COA. The minor alterations and additions addressed the "most dangerous likely" enemy COA. Since the Commander's COA was necessarily high level to begin with, the Staff must undertake mission analysis, staff analysis, development of own and enemy COAs, and COA validation in order to 'operationalise' the Commander's COA (i.e. determine the plan at a detailed level).

There were several elements of plan execution that the observers did not see, but logically assumed had happened. For instance, the observers did not see a doctrinal decision brief during planning cycle # 2. However, the Commander must have made a "decision" regarding his chosen COA (largely concerned with the detailed options to successfully achieve the plan, rather than the general objective(s) of the plan). This is in accordance with CFOPP doctrine, which states that a Commander with significant relevant experience may choose to abbreviate the OPP or conduct some Staff functions himself. This approach by the Commander impacted the Staff in a couple of ways. First, Steps 1.4 - 1.6 were very detailed and left minimal flexibility for the Staff. This was not a problem and well within the "rights" of a Commander. Second, the Staff drew heavily on the work done in the previous phase, particularly the Step 2 work. This is not to suggest that Step 2 was done to a doctrinal standard, only that the Staff felt that sufficient orientation was in place to proceed with the planning.

While a fairly complete cycle was observed, the problem wasn't "new" in the sense that the Commander or Staff felt compelled to conduct a complete OPP. They were quite comfortable integrating earlier operational planning work into the effort. This wasn't surprising as cycle #2 was merely an extension of the existing operation. Just how much formal planning per the CFOPP can occur once the "decision" is essentially made? It may be more accurate to suggest that once a commander provides "the" course of action, the Staff's task is to ensure that the directed COA provides a reasonable, if not the best, solution against the problem at hand.

One further observation is necessary regarding the looping back and forth of the Staff. Although the OPP is a prescribed process for planning "... it is a mistake to view the process as a sequence of discrete, distinct activities" (National Defence, 1996). This statement implies that there will always be some to and fro between different functions in the planning process, as new functions will trigger additional considerations for completed functions. It can be argued that with greater resources and thus more perspectives on a problem this would not happen at the level of a larger formation. However, group decision-making processes in which the perspectives of a particular leader predominate may suggest otherwise.



Please refer to Annexes A and B for an illustration of all functions and sub-functions that were performed, and the order in which they were performed. Refer to Annex C for an overview comparison of the functions observed during planning cycle # 2 and the functions outlined in the doctrinal OPP.

### ***Planning Cycle #3***

In the third planning cycle, the Staff were observed to engage in sporadic OPP functions from *Initiation* to *Course of Action Development* and *Decision*. This limited application of the OPP may have represented the initial functions in a planning process, but observation of how it developed into a full planning process was curtailed as the plan was transferred to the operations side of the Brigade headquarters. It should be noted that G-2 Plans and a number of additional Planning Staff were assigned to the Ops cell to help with this planning so in some ways the planning cell was still involved even though they did not have primary responsibility for generating the plan. The planning cycle was not observed past the point that it was handed over to Ops given that the focus of this project was on the Planning Staff preparing for future operations.

During this planning cycle, functions observed included most of the steps in *Initiation* (with the exception of activate Planning Staff, who were already active), none from *Orientation*, staff analysis and develop own COAs from *Course of Action Development*, and the preparation and presentation of the decision brief. Two reasons for the limited application might be that the plan addressed an evolving situation in which much was known, therefore limited thinking needed to be devoted to the consideration of the enemy's COAs, nor to orientation about the situation, because they were fully immersed in the situation; and, related to this, that the lack of time meant that the Planning Staff had to focus on what 1 CMBG should do. This latter point about time is reinforced by the fact that the plan was transferred to Ops.

Please refer to Annex B for an illustration of all functions and sub-functions that were performed, and the order in which they were performed. Refer to Annex C for an overview comparison of the functions observed during planning cycle # 3 and the functions outlined in the doctrinal OPP.

### ***Planning Cycle #4***

The fourth planning cycle represented a sequel plan for Planning Cycle #2 and was initiated at the behest of the G3. This planning cycle was observed from *Initiation* to *Orientation* with minimal observation of *COA Development* as this represented the end of the observation period. This planning cycle also came at the end of a long period during which the plans cell had received no direction. During this time the Planning Staff concentrated on expanding on the factors and deductions that could be used more generally in any planning activity. While these factors and deductions may not take account of enemy capabilities, they would consider terrain, civilian organisations, infrastructure, etc. and the manner in which the enemy and 1 CMBG could exploit these. This was not done once planning for cycle # 4 had begun, although one could argue that having done this during the inactive period, there was no need to repeat it during planning cycle # 4.

Annex C outlines the functions performed in this planning cycle. Most of these functions pertain to *Initiation* and *Orientation*, with some development of own and enemy COAs, coupled with plan development. However, any further analysis of this particular planning cycle was not conducted given the lack of meaningful data.

## 4.5. Critical Decision Analysis

An analysis of critical decisions made by the Planning Staff during the planning process was conducted for planning cycle #2 (see Table 2 below). The reason for choosing to conduct a decision analysis of planning cycle #2 only was that this was the single planning cycle that was observed from Step 1 (Initiation) through to Step 5 (Plan Development). This analysis was based on key decisions identified in the tabular task analysis of the OPP (Bruyn, Lamoureux & Vokac, 2004) supplemented by additional decisions observed during EX VIRTUAL RAM.

**Table 2: Critical Decision Analysis**

Critical Decision	Relevant OPP Step	Decision Maker	Decision Requirements	Outcome of Decision
What planning tools and information are relevant for planning process?	1.3 – Gather Planning Tools and Information	G3 Plans	Direction from Cdr	
How much direction to give staff in planning process?	1.4	Cdr	Knowledge of experience of planning staff	Cdr tells planning staff that he wants staff to check his COA and provide a plan
How should OPP be abbreviated?	1.4	Cdr	Experience with OPP Knowledge of experience of staff	Cdr decides he wants a plan, not other COAs and a decision (i.e. abbreviate COA development)
What initial guidance is important?	1.6	Cdr	Previous guidance provided Cdr's own mission analysis	Cdr decides start state, assumptions and tasks given by higher command Cdr decides on implied tasks provides very detailed mission analysis along with assumptions
G2 Plans decides to assume that enemy has no credible organization	2.1.3.5	G2 Plans	Mission analysis Calculation of enemy force effectiveness	
Must decide on relevant deductions reached during mission analysis	2.1.4	Cdr	Mission analysis	Cdr decided main effort, secondary effort, endstate and priority of effort based on mission analysis

Critical Decision	Relevant OPP Step	Decision Maker	Decision Requirements	Outcome of Decision
Must decide which concerns to address in mission analysis brief	2.1.5	Cdr	Mission analysis Experience of Staff and Cdr	Cdr did mission analysis and gave briefing to staff
Must decide which deductions are relevant and which should be dismissed	3.2 – Staff Analysis	Cdr and G2 Plans	Mission analysis Experience of Staff and Cdr	Staff analysis – Cdr gave a lot of detail/assumptions. G2Plans discusses with ops to determine deductions G3 talked to CIMIC and G2 to validate factors and deductions (i.e. COA provided by Cdr)
Must decide start point of planning process given Cdr's guidance	1.6.1	G3 Plans	Cdr's guidance Mission analysis for previous planning cycles	G3 Plans decides to use evaluations from previous plan as start point
G2 Plans decides on geographical factors and how they affect Bde	3.2.1.1	G2 Plans	Mission analysis	
G3 Plans assumes that Bde has 80% combat effectiveness	3.2.1.4	G3 Plans	Mission analysis Calculation of own force effectiveness	
G2 Plans decides on most likely and most dangerous COAs	3.3	G2 Plans	Mission analysis Staff analysis	Provides the basis for assessing 1 CMBG COA for suitability, feasibility, acceptability, and completeness
Are enemy COAs significantly different from one another?	3.3	G2 Plans	Staff analysis Determine advantages and disadvantages to enemy for each COA	Used phase 2 enemy COAs – in general COAs developed were quite similar (slight nuances differ) but not greatly different

Critical Decision	Relevant OPP Step	Decision Maker	Decision Requirements	Outcome of Decision
Are own COAs significantly different from one another?	3.4	G3 Plans	Staff analysis Test viability of own COAs	Cdr gave them own COA – had to put “meat on bones”  Made adjustment to Cdrs COA by end
G3 decides on timelines for own COA	3.4.4	G3 Plans	Mission analysis Staff analysis	Led to “fleshed out” COA presented by COS
Must decide whether to develop new COAs based on Comd further guidance	3.7	G3		G3 provided additional guidance on endstate and CIMIC cell before wargame
G3 Plans decides that G4 Plans (scribe), G2/G3 plans, G3, G2, G5, aviation, C2 (G6) & ISTAR will be involved in wargame	3.7.5.10	G3 Plans		COA validation made with broad Staff representation. Greater collective input allowed for greater confidence in ultimate recommendation.
G3 Plans selected Belt (Avenue-in-depth) wargame method across start line	3.7.5.8	G3 Plans	Staff analysis	

Critical Decision	Relevant OPP Step	Decision Maker	Decision Requirements	Outcome of Decision
Which COA(s) to abandon and retain as a result of criteria comparison, intuitive comparison and wargaming	3.7.5.10	G3 Plans, G2 Plans	Outcome of criteria comparison Outcome of intuitive comparison	Validating selected COA didn't compare, select and retain COAs  No criteria comparison  G3 did ask what criteria used – G3Plans said non because only 1 COA  Did intuitive comparison of formation possible movement with terrain  No comparison of the COA, since Cdr selected only one COA
Must decide which COAs to recommend	4.2 – Decision Brief	G3 Plans	COA validation - COA comparison	Not really a decision brief – more of a briefing to Cdr  COA selected by Cdr prior to giving guidance  Planning staff just fleshed out COA  G3 Plans modified COA to address enemy's most dangerous COA b/c that's what's panning out
Must decide which COA is most appropriate to achieve mission	4.3 – Cdr selects COA	Cdr	COA validation	COA selected by Cdr prior to giving guidance



Critical Decision	Relevant OPP Step	Decision Maker	Decision Requirements	Outcome of Decision
Comd decides if branch and sequel plans required	5.5	Cdr	Mission analysis Staff analysis	None done, although called Phase 4 a sequel plan but not identified as such at this point
Must determine critical events and decision points to include and exclude in plan wargame	5.6.2	G3 Plans, G2 Plans	Staff analysis COA validation information	No wargame done; FRAG O issued
Must decide on plan evaluation criteria	5.6.3	G3 Plans, G2 Plans	Mission analysis	No wargame done; FRAG O issued
Must decide on wargame method for plan wargame	5.6.4	G3 Plans, G2 Plans	Staff analysis Selected own and enemy COAs	No wargame done; FRAG O issued
Must decide whether to reinitiate OPP if situation changes	6.0	Cdr, COS	Cdr's assessment	Didn't reinitiate OPP, just started OPP for phase 4  G3 revisited plan once in Ops cell

The table above indicates that the planning process is indeed “command driven” with the Commander being involved in 9 out of 26 critical decisions. Most of these critical decisions are more concerned with fundamental aspects of planning (e.g. whether to start a new plan) while individuals such as the G3 Plans are concerned with critical decisions at a fine level of detail.

It also seems that all decisions have a “trickle down” effect, either positive or negative. For instance, the decision about which are the enemy’s most likely and most dangerous COAs provides the basis for assessing the own COA for its suitability, feasibility, acceptability, exclusivity and completeness. If the enemy’s COAs are chosen poorly, then the implications for 1 CMBG would be negative. If the enemy’s COAs are chosen well, then the implications would be positive.

Finally, it is clear some decisions are merely “mechanical” in nature (what type of wargame should we conduct) and others are more “abstract” (ways to abbreviate the planning process). The mechanical critical decisions have a limited number of possible options and have well-learned criteria associated with them. The abstract critical decisions tend to have a larger number of possible options and no established criteria associated with them.

#### 4.6. Analysis of ‘Loops’

Speculative analysis of the incidence of ‘loops’ was undertaken. A loop was defined as an instance in which the planning cycle, having been moving forward through the sequence of functions, went back to a function that had previously been performed or had not been performed but was earlier in the

sequence. In particular, analysts were searching for evidence to suggest that the incidence of loops was greater at higher functional levels than the lower sub-function levels.

The following table (Table 3) shows the percentage of total moves that were loops. The table is broken down to show how this level changes at different levels of decomposition.

**Table 3: Incidence of Loops at Various Functional Levels**

	<i>% of total moves that were loops</i>
Highest Decomposition (eg. 3)	30.00%
Second Highest Decomposition (eg. 3.2)	25.81%
Second Lowest Decomposition (eg. 3.2.1)	22.64%
Lowest Decomposition (eg. 3.2.1.4)	17.57%

At the highest level of decomposition, the percentage of the total moves that were loops is highest. As you move toward a lower level of decomposition, the percentage decreases. Of course, this does not mean that there were more loops in absolute terms. At higher levels of decomposition the process moves from function to function less frequently. However, as a proportion of the total moves, loops are greatest at the higher levels of decomposition

At the highest level of decomposition there are 3 loops. The pattern 3 (Course of action development) → 2 (Orientation) is repeated twice, and 5 (Plan Development) → 3 (Course of action development) occurs once. At the second highest level of decomposition there are 8 loops. The pattern: 3.7 (COA Validation) → 3.2 (Staff Analysis) occurs twice. Additionally:

- 3.4 (Develop initial own COAs) → 3.1 (Review Commander's Planning Guidance)
- 3.4 (Develop initial own COAs) → 3.2 (Staff Analysis)
- 3.2 (Staff Analysis) → 2.0 (Orientation)
- 3.2 (Staff Analysis) → 2.1 (Conduct Mission Analysis)
- 5.4 (Prepare Plan) → 3.7 (COA Validation)
- 5.4 (Prepare Plan) → 5.1 (Further refine Comd intent and concept)

The common movements are between 3.2 and 3.7; and 3.1/3.2 and 2.0/2.1. This first movement (3.2 and 3.7) implies that there is a loop back between COA Validation (3.7) and Staff Analysis (3.2). The second movement (3.1/3.2 and 2.0/2.1) could imply that the Staff Analysis (3.2) and Mission Analysis (2.1) are performed less chronologically, and more simultaneously.

Another common loop is from 2.1.1 to/from 2.1.2. This repetition suggests that the review of the situation (2.1.1) and review of higher level information (2.1.2) are performed simultaneously. Analyze factors and make deductions (3.2.1) is returned to 5 times (thus performed 6 times) throughout the process. This suggests that this step too, is more of a continual process. 3.7.3 (Continue staff checks and analyses of own COAs) consistently follows 3.7.2 (Refine COAs selected by commander), suggesting that these functions are well associated in practice.

## 5. General Observations

### 5.1. Contextual Constraints

#### Mission type

This exercise assumed a ‘three block war’. The three block war can be considered a ‘complete’ mission, where the first block involves full-scale combat operations, the second block sees the mission moving toward peace enforcement, and the third block involves the mission objective being peace support (distribution of aid, non-governmental agencies, etc.). In the modern military arena, all three elements of a three block war may occur simultaneously within the same mission. This makes decision-making an even more difficult process. The traditional CFOPP, while a tool to arrive at a reasonable solution, is challenged when faced with a multi-faceted environment in which it is not clear what factors may become variables in the planning scenario. The ‘typical’ application of the CFOPP involves the consideration of the enemy’s most dangerous and most likely COAs. Developing a plan to address these enemy COAs does not necessarily account for the asymmetric nature of modern operations. This asymmetry may even require the planners to address considerations that do not seem likely and may not be particularly lethal. Does the CFOPP allow one to “think outside the box” when dealing with the challenges of contemporary military operations? A stated objective of the planning process is “to maximize the commander’s and Staff’s creative thinking and associated thought processes. Additionally, “[t]he planning process is designed to optimise logical, analytical steps of decision making in conditions of uncertainty and ambiguity.” Does the CFOPP fail to maximize the potential of creative thinking? By teaching a focus on most likely and most dangerous COAs, does the CFOPP reduce the Staff’s ability to consider ‘unknowns’ in their plan? Of course, a major factor in determining how ‘realistic’ the most likely and most dangerous COAs are is time.

#### Time constraints

As is common in operational planning, time seems to be the primary factor affecting many procedures including the application of the OPP. Depending on the operational situation, there will be varying amounts of time in which the planning team has to develop a complete plan. During EX VIRTUAL RAM we were able to observe planning cycles in which time was restricted and the OPP had to be abbreviated as well as a planning cycle in which the planning team was not restricted in time but they were waiting for input from higher levels. In this latter case, members of the planning team stated that they could only go so far with the planning without more input from higher levels. Thus, in this instance, it appeared they were taking a more reactive approach to planning; waiting to receive information, possibly to make better decisions, before acting rather than trying to anticipate what may be needed. A reactive approach may be one potential outcome of a command-driven process, although mission context may also be an influence. In some circumstances Planning Staff may want to proactively seek the Commander’s guidance, or engage in planning activities based on anticipated enemy actions and future requirements. To support the view that the Planning Staff can act on their own initiative without contradicting the command-driven nature of the process, it was observed that the planning team did a pseudo-mission analysis without some of the required info in order to move the planning process forward.



Ironically, this exercise may not have imposed 'strict' time constraints on the Planning Staff. It was observed that the Planning Staff continued to work on the plan both before the 'official' day began and after it ended. Planning Staff also continued to work on the plan during the three hours they were supposed to be moving the headquarters. It was observed that while the *Orientation* phase (Step 2) of the OPP often involves in-depth analysis for the first planning cycle in an operation, subsequent planning cycles may not require this level of analysis given that COAs can often be built on mission analyses done in previous planning cycles. Clearly, this assumes that the mission itself does not change significantly, but the use of a previous mission analysis can be a significant time saving for the planning cell. However, the Commander should be involved in this decision as orientation is arguably the most important step of the OPP.

Time seemed to be at a premium for the Planning Staff. What was missing was the intuitive feel to know how long it took to "get things done." For example, the Planning Staff always seemed to be concerned with the amount of time it took to prepare the order (i.e. the mechanical process of writing, printing and producing it). This, coupled with very tight timelines, made the Planning Staff scramble to meet requirements. Planning and planners must always be focussed. Ideally, they would have constant guidance from the Cmdr, COS, or G-3. Absent that, planning and planners must be able to visualize future requirements so as to avoid "reactive" planning. Lastly, when the Planning Staff finds time compressed, particularly between the end of Step 3 (*COA Development*) and the end of Step 4 (*Decision*), it becomes ever more difficult to synchronize planning efforts across the Staff. This potentially leads to difficulty "collating and manipulating that information into a complete, coherent and clear expression of the plan." In sum, the written plan runs the risk of being fraught with error.

### **Transfer of Plan from Plans to Ops**

Within the Staff, "ownership" of the plan must eventually migrate from plans to operations. While the Planning Staff may hold a COP (Contingency Plan) for an indefinite period of time, a plan that will be executed in the near-term must be given to operations to actually activate or implement the plan, at which time it becomes an OP O (Operations Order). The Planning Staff commented that if a plan is to be transferred to operations, it must be determined at what point in the planning cycle this is best done to minimize the amount of confusion. The transfer of a plan is not necessarily a "clean" transfer, for example, it was observed that the planners occasionally made adjustments to plans already in the hands of operations.

Also, as seen in EX VIRTUAL RAM, the planning cell may provide select members to help ops with planning. In this instance, certain members of the Planning Staff may be required to support both current ops execution and future ops planning. In this case, the resources available for future ops planning are reduced and the Planning Staff must find a way to compensate for this.

### **Step-up**

At one point during EX VIRTUAL RAM, the Brigade headquarters simulated a 'step-up', where select members of the HQ (Cdr, COS, etc.) are required to move to a new location and establish the necessary command and control. With the 'step up' commanding and controlling the current operation, the main headquarters is able to focus on the administrative and logistical challenges of moving the main headquarters. Use of the 'step up' minimizes, as much as possible, disruption that can occur when the headquarters itself is moved to a new location. During EX VIRTUAL RAM, when it was announced that there would be a step-up, the planning team, as well as all other cells within the HQ, had to identify, first, a logical break point in the planning cycle and, second, which

members of the Planning Staff would move to the step-up location since not all members of the planning cell could go. During step-up and relocation of the Brigade Headquarters, the planning team is divided and the process of planning for future operations must be modified accordingly.

In practice, the planning cell continued to work on the plan during the three hours that were allotted to the transfer of the headquarters. This would seem to indicate that if some way were found to continue planning during such a move, the additional time would be welcomed by the Planning Staff. Since much work is done collaboratively between the G-3 Plans and G-2 Plans, pulling in the other members of the planning cell as required, at boards with clear plastic overlays, the step-up and subsequent move can significantly impede the collaborative planning which is such a feature of the plans cell. Electronic means of collaborative working could be one way of overcoming this.

## 5.2. Limitations

One major limitation identified during data analysis was the fact that not all functions within the OPP are observable and therefore certain assumptions were made on the part of the observer in terms of what functions were actually performed. For example, Step 5.6.5 in the OPP is “select method to record and display results” of the wargame. Therefore, if it was observed that the G3Plans 2 was recording the results of the wargame, it can be assumed that the G3Plans2 or G3Plans actually made a decision as to how to record the results of the wargame, although this would be unobservable. In this case, the observers may or may not have marked that this sub-function of the OPP was performed. In some cases, it was possible to deduce that a particular function had been performed based on subsequent functions performed or actions taken (indirect observation). Hence, if a function is not highlighted, it means that it was not observed either directly or indirectly.

An extension of this perspective relates to the whether the performance of a higher level function means that all sub-functions were performed. This is not thought to be the case. The clearest example of this is function 3.2.1 Analyze factors and make deductions. There are eleven sub-functions to this function, ranging from analyzing the area of operations to analyzing the assigned and implied tasks. It is conceivable that, although the Staff analyze factors and make deductions, they do not consider all the factors and deductions listed in the CFOPP. Thus, the observers did not make this assumption.

### OPP at the Brigade level

1 CMBG operates primarily at the tactical level of war and is the lowest level land formation able to use the CFOPP as intended. However, some aspects of planning within a Brigade may reflect the formal estimate process (refer to Bruyn, Lamoureux & Vokac, 2004, for a comparison of the estimate process and the CFOPP). As such, certain functions within the OPP are not very meaningful at the Brigade level, primarily those that relate to principles of joint warfare and the mission at the operational level (i.e. Division level). Within Function 3.4 of the OPP (*Develop Initial Own COAs*), for example, there are sub-functions that call for consideration of principles of joint warfare (function 3.4.2). At a mostly tactical level such as the Brigade, principles of joint warfare are not really a consideration because the Brigade’s focus is primarily on single force (Army). This makes sub-functions such as 3.4.2, which calls for the synchronization of ideas in terms of principles of joint warfare, less meaningful at the Brigade level than the Division level.

As noted above, the Brigade operates at a tactical level. This means that operations occur shortly after the headquarters Staff are directed to consider them. This lack of lead time can make an

exhaustive analytical process like the OPP difficult to apply comprehensively. Another factor facing the Brigade in the application of the OPP is a lack of resources. Since the OPP is derived from a more senior level of planning processes, a larger Staff is assumed. The Brigade simply does not have the numbers required to do a comprehensive application of the OPP. However, it is felt by the observers that the general outline of the OPP is still useful at Brigade level, and an analytical process is followed, but the lowest level of sub-function in the doctrinal OPP is achieved through intuitive means rather than analytical.

### **Training and experience**

The ability to fully apply the CFOPP as a coordinated process to determine the best method of accomplishing assigned operational tasks and to plan possible future tasks is a function of the Commander and Staff's collective experience, training, and professional military education. Formal exposure to the CFOPP, either in an operational context or educational context, outside of purely 1 CMBG training activities, resided with the Commander, Chief of Staff, and G-3. In terms of the primary planning cell, only the G2 Plans had taken the Army Operations Course (AOC) at CLFCSC in Kingston. Staff assigned to the planning cell will often be inexperienced in the application of the OPP. Opportunities must continually be sought to broaden both their training and their experience. That said, 1 CMBG had made great use of "opportunity training" looking to increase CFOPP knowledge amongst the Staff. It should also be noted that the 1 CMBG Staff was not a completely "cohesive" element in that several key personnel were "borrowed" from other organizations. That made application of the CFOPP an even greater challenge.

As noted above, this education and experience will furnish the Staff with an appreciation of how long a step will take, and how long they can afford to devote to a step when they realise time is compressed. It is understood that it is the objective of the Land Force is to provide the Land Force Command and Staff Course to all regular force Captains. This course provides the introduction to the OPP. This, coupled with opportunities to practice its application under realistic conditions, is essential for the Staff's competency.

## **5.3. Other Observations**

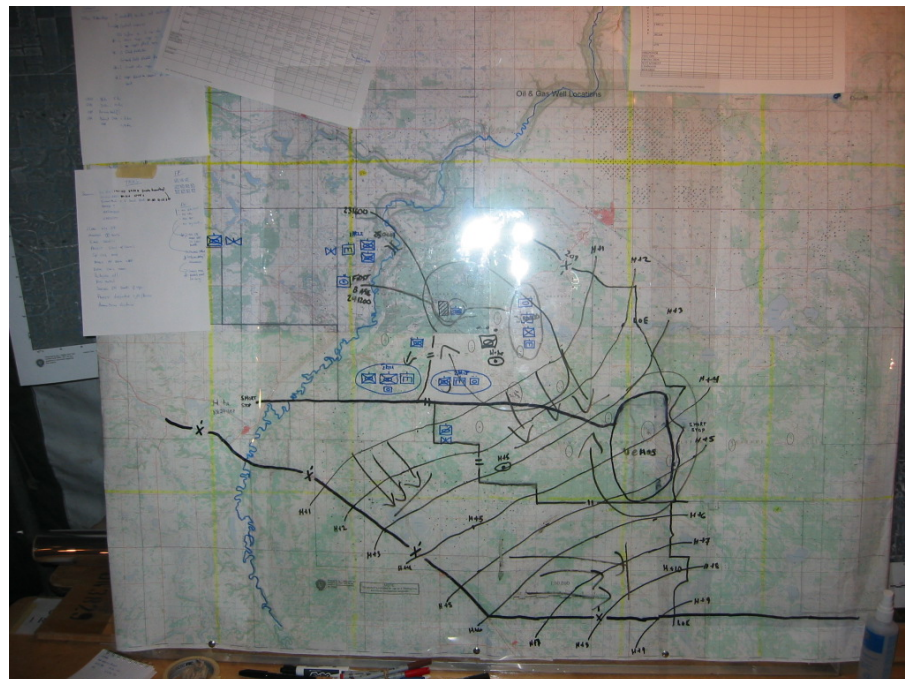
### **Validation**

The data collected by the observers was validated after the After-Action Review, the day after the exercise finished. This validation was based on initial analysis and mapping of the observations to the doctrinal OPP. The validation was conducted with the G-3 Plans. The G-3 Plans had only received informal training in the CFOPP and based his application of the CFOPP on his own implicit understanding of the process. Because of this understanding, the G3 Plans was surprised with how much of the CFOPP had been conducted during this exercise. His understanding was at a coarser level of description than that described by Bruyn et al (2004). The G3 Plans did not disagree with the mappings of the observers.

Subsequent to validation with the G3 Plans, the SME resident in the observer team conducted detailed validation of the data based on his own observations of the process. This extended the number of OPP functions actually conducted compared to the original mapping. As noted elsewhere in this report, more formal training and experience with the OPP would equip the planning cell with a greater familiarity with the OPP and permit them to apply it more efficiently.

## Common intent

There were several examples of activities that served to focus the Planning Staff and attempt to align their mental models of the plan. For example, there were regular briefings between the COS and both G2 Plans and G3 Plans. Most commonly, however, the Planning Staff worked collaboratively at boards onto which were fixed large transparent overlays (see Figure 6 and Figure 7). Underneath these overlays (on the boards) were large topographic maps. The maps and overlays displayed all known information about the operational environment, and could be added to or amended to reflect new intelligence, or considerations that had not previously been made, or a subset of considerations or a subset of the plan. At any point, another member of the headquarters could view an overlay and establish how advanced the plan was and how it matched his own plan. Overlays, when complete, formed a crucial component of orders and were reproduced and transported to the subordinate units.



**Figure 6: Example of Board with Transparent Overlay  
(shows expected progress of plan in time)**





**Figure 7: Example of Collaborative Planning using Boards in Plans Cell**

In addition to regular briefings and overlays, another example of an attempt to align or adjust one's mental model of the plan was observed in the second planning cycle when the COS asked the G3Plans to repeat his interpretation of the mission guidance provided by the Commander. In this instance, the G3Plans' interpretation was not in line with the Commander's guidance so this action taken by the COS ensured that the G3Plans had a common understanding of the Commander's mission analysis and guidance.

Regular Battle Update Briefings (BUB) were held in the headquarters to inform all individuals of the status of other groups' activities. These also served to give the Commander or Chief-of-Staff (COS) an appreciation of where his attention should be focused. The Commander and COS also moved quietly between the different cells in the headquarters to get private updates on their activities and often some sort of discussion would ensue. To the observers, these discussions seemed to assist in bringing the various cells in line with the Commander's intent by giving everyone the opportunity to hear what others were doing and correlate those activities with their own. If one's activities seemed incongruous with others', clarification could be sought. The Commander would also meet privately with the COS and the G3, again, presumably to ensure that they fully understood his intent. This was particularly important as the Commander was often required to be absent from the headquarters leaving the COS as his on site representative.

### **'Typical' Missions**

As noted in section 2, there are a number of application contexts for the CFOPP. The exercise observed at CFB Edmonton exhibited characteristics of most of these application contexts. In



particular, the exercise conformed to the listing of activities for routine operations from the CJTL. That is, the exercise exhibited: Command, Information and Intelligence, Conduct of Operations, Mobility, Force Protection and Sustainment. The exercise also satisfied the international contingency aspect of CF planning because the situation was not routine. The scenario also required the raising of a Joint Task Force (JTF) as a grouping was created specifically for the contingency operation and involved more than one service (i.e. Land and Air components).

In as much as the exercise represented a 'typical' mission, both the doctrinal OPP and OPP applied during this exercise have merits. Doctrinal OPP presents every step that the Commander and planning cell should consider, and increases the probability of a good plan assuming enough time and resources are available. The OPP as applied during this exercise exhibited more shortcuts and more intuitive decision-making at a lower (individual function) level. This is a natural strategy to cope with a lack of time and/or resources. However, doctrine states that only the commander (at Brigade level) has the experience and knowledge to make intuitive decisions and abbreviate the OPP appropriately. Perhaps training, as well as teaching the OPP, should also furnish planners with recognition-primed decision making skills through the use of scenario-based training.

### **Effects-based planning**

Interestingly, in spite of the Commander's efforts to communicate his intent, one AAR (After Action Review) focused on 'Effects-Based Operations' and the fact that the headquarters Staff did not truly pursue an effects-based campaign. Certainly the plans cell seemed biased toward traditional manoeuvre operations. Within the confines of the exercise, it may have proved difficult to truly enact an effects-based operation; one which included psychological operations, media campaigns and the establishment of a particular point of view on the part of the citizens of the affected country. However, the plans cell did not often consider these options. Ideally, a truly analytic process would consider these alternative options, so this example is furnished as evidence of intuitive decision making processes at work at the individual level of activity. It also points to a shortcoming in the command-driven process, as it was the intent of the Commander that an effects-based operation be pursued. However, it is felt that having made this observation during the AAR, the Commander can be reasonably sure that in future his Staff will always look for opportunities to pursue effects-based operations as well as manoeuvre-based warfare.



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## 6. Conclusions

The OPP at Brigade-level, with the possible exception of initial planning, will almost always be time constrained. As such, the process will be abbreviated and requires specific planning direction from the commander. While Staff supported, the planning process remains firmly entrenched in the hands of the commander. In his absence, the COS and/or G3 must be able to act “for the commander”, able to divine and implement his intent. Although there were several examples in which the OPP, as outlined in doctrine, was abbreviated by the Planning Staff of 1 CMBG during EX VIRTUAL RAM, overall the Staff followed more of a step-by-step analytical approach rather than an intuitive approach to decision making. This may, in part, be a function of the context. That is, it was a Brigade level exercise in which a training goal was to apply and practice the OPP. However, at the individual level it is felt that the input of various Staff to the OPP was intuitive, or at least based on their own estimate of the situation, compiled from various sources. Since the G3 Plans had only one assistant, this is not surprising, and it serves to clearly delineate the OPP as an analytical process conducted at the Divisional level and higher with the resources and time available at those levels, versus the OPP as a hybrid and abbreviated process, conducted at the Brigade level with limited resources and time.

The conclusion that the OPP at Brigade level seems to be a hybrid of analytic and intuitive decision making leads to further conclusions. In particular, training curriculums can be devised to complement this approach. Traditionally, soldiers have received training in Battle Procedure, which teaches them what to do in certain, generic, situations. Further training is received in the Estimate when the soldier reaches an appropriate rank, and then training in the OPP is received when the soldier is promoted to Captain. In the course of this time, the soldier would ideally have a wealth of ‘real-life’ experience to complement the training, but this is becoming harder to acquire. Rather, training and education can teach *processes* such as the OPP, that cover analytic decision making and similar activities, and can teach *scenarios* such as would be encountered by the soldier in infinite variations. Scenario-based training can be highly effective because it teaches a person to quickly recognise the situation they are in, and thus quickly choose a method of dealing with that situation. This type of scenario-based approach exploits intuitive decision making styles and forces the student to engage in planning activities so that the processes and the possible scenarios become well-learned. Applying intuitive processes to planning would render soldiers initially more advanced in their planning, with a workable plan already available, but waiting to be embellished to match the nuances of the situation. Currently, doctrine states that only the Commander has the experience and skill to do this, but at the level of the individual Staff member an intuitive approach could lead to more efficient planning. However, it should be noted that this conclusion only refers to the lowest level of OPP subtasks (e.g. 3.2.1.5 analyze time and space); the use of intuitive decision making at the highest levels of OPP tasks (e.g. 3.0 Course of Action Development) should remain the Commander’s prerogative.

It was also found that Staff seemed to loop back and forth through the steps of the OPP. This indicates that rather than being a strictly linear and sequential process, the OPP is more of an iterative process, at least at the Brigade level. It is not possible to extend this conclusion to the Division level or higher. It is felt that the application of the OPP, as an analytic process, at the Battalion level would be iterative, although it is more likely that the use of the OPP at this level would be a loose approximation of the OPP more intuitive in approach. These conclusions have implications for the design of tools however. During the observations for this work Staff spent



much time creating planning products (e.g. orders, synch matrix, decision support templates). These tasks could be supported, but such support should not assume that the OPP is a linear process. Such tools should permit the user to move unencumbered between different stages and sub-functions in the OPP, to permit an iterative, intuitive approach.

It has been frequently noted in this document and its predecessor (Bruyn et al, 2004) that the OPP is a tool for Division level and above. Division level formations operate on a planning cycle that is necessarily longer than Brigade level, and with a corresponding increase in the resources available, and of the complexity of the problem. During this study, the G3 Plans and G2 Plans positions involved two people each. This is unlikely to be enough to engage in an exhaustive OPP for a scenario as complex as that experienced during EX VIRTUAL RAM, nor to sustain 24/7 planning. Periodically, we observed the Planning Staff involved in detailed consideration of particular aspects of the plan, leaving little or no time to consider other aspects. Ideally, the structure of a position in a plans cell would include several people, with one officer holding overall responsibility to ensure all possible aspects of the plan are being considered. Clearly two people does not allow this.

Time remains the most precious of resources. Time lost can never be recovered. Planning is an iterative, continuous process that must continue even with lack of specific guidance or higher direction. Planners must have the intellectual capacity to visualize and anticipate future requirements. This is not to suggest that planners can replace the commander – they cannot. However, planners must always ensure that the organization is prepared to handle branches, sequels, or new missions in an efficient and effective manner. As intimated above, there also was not enough time to comprehensively apply the OPP. The tempo of battle meant that the Commander could order a plan to be enacted at any time, assuming conditions were appropriate. This means that the plans cell must operate under conditions of some uncertainty because their plan may move to Ops at any point. Their planning must take on an element of ‘satisficing’ (decide on and pursue a course of action satisfying the minimum requirements to achieve a goal) in order to always be ‘close enough’ to completion to meet the needs of the Commander. This reinforces the conclusion that intuitive processes were adopted at the most detailed levels of planning, and that not enough time was truly available to practice the OPP. Although additional Staff and tool support could alleviate this time pressure, the nature of the OPP is such that Brigade level operations are unlikely to ever apply the OPP as an analytical, sequential process.

## 7.Future Work

The findings and conclusions from this project suggest four main thrusts for future work:

**Doctrine** – The OPP is characterised as an exhaustive analytic technique to be employed jointly by a Commander and Staff. Some dispensation is given to the Commander to engage in some intuitive planning. The Directorate of Army Doctrine may want to consider changing the doctrine associated with the CFOPP to reflect the reality of how it is applied (i.e. iteratively, and with intuitive approaches), or else restrict the application of the CFOPP to Division level and higher, developing a more streamlined process for Brigade and Battalion levels.

**Process Refinement** – Given the potential follow-on work described above, effort should be directed to developing an abridged OPP. That is, a planning process that reinforces the good practices exemplified by the CFOPP, but reflecting the realities of its application in terms of time and resources. However, are there critical paths that must be followed? Specifically, are there certain steps that must occur sequentially and other steps that can be “packaged” as dictated by the nuances of a particular situation? For example, 1.6 (Comd issues initial comd’s guidance) cannot occur before 1.5 (Comd makes initial assessment). But is the Staff precluded from commencing 2.0 (Orientation) before the completion of 1.6? Certain intuitive activities could be begun by the Staff that would facilitate planning and may even occur on a more individual, intuitive basis. So, continuing with the example, though the process is command-centric and command-driven, it may not mean that planning should stop in the absence of the commander. Such a stream of work would need to include comparative assessments of the performance of the two (or more) approaches.

**Training and Education** – The OPP, even in modified form, is the heart and soul of planning at the Brigade level. It is highly recommended, given the fact that a Brigade Planning Staff must be able to competently and confidently apply the OPP, that exportable Staff training packages be developed by the LFCSC for delivery to the three Brigade headquarters on an as needed basis. Irrespective of whether doctrine or the process are changed, training should allow soldiers in a planning role to develop their experiential skill base, so that they can quickly and accurately make intuitive decisions at the lowest level of sub-function in the OPP. Note that this is a different approach to giving soldiers extensive training in the OPP; this approach concentrates on giving soldiers tactical scenarios to solve, thereby increasing their experience, but in simulated situations (simulation can include table top exercises up to full-scale immersive technological simulation).

**Automated Support** – Staff during EX VIRTUAL RAM felt that they spent a disproportionate amount of time on mechanical, mundane tasks such as production of orders, creation of synch matrices and decision support templates. Work should attempt to automate, or at least support, these types of tasks, leaving the Staff to focus on novel problem solving and decision making pertaining to all factors inherent in the battlespace.



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## 8. Acknowledgements

Humansystems Incorporated® would like to acknowledge the assistance and hospitality given by the Commander, Land Force Western Area (LFWA, Brigadier General Stuart Beare), 1 CMBG (Col Tim Grant, LCol Shane Schreiber, Maj Rob McIlroy, Capt Rich Raymond and Capt John Bruce) and the subordinate units involved in the exercise, in particular 2<sup>nd</sup> Battalion of Princess Patricia's Canadian Light Infantry (2 PPCLI, LCol Stu Sharpe). Without their cooperation and forbearance, this study would not have been possible.

Additionally, we would like to thank 3 PPCLI (LCol Wayne Ayre) for taking the time to discuss their Recognition-Primed planning process and provide some briefing material.



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## 10. List of Acronyms

AAR	After Action Review	Frag O	Fragmentary
AOC	Army Operations Course	HQ	Operational Order Headquarters
Bde	Brigade	ISTAR	Intelligence; Surveillance; Target Acquisition; Reconnaissance
BUB	Battle Update Briefings	JTF	Joint Task Force
C2	Command and Control	LFWA	Land Forces Western Area
Cdr	Commander	LNO	Liaison Officer
CF	Canadian Forces	NDHQ	National Defence Headquarters
CFB	Canadian Forces Base	OP O	Operations Order
CFOPP	Canadian Forces Operations Planning Process	OPP	Operations Planning Process
CIMIC	Civic-Military Cooperation	Ops	Operations
CJTL	Canadian Joint Task List	PPCLI	Princess Patricia's Canadian Light Infantry
CLFCSC	Canadian Land Force Command and Staff College	PTA	Primary Training Audience
CMBG	Canadian Mechanized Brigade Group	SA	Scientific Authority
COA	Course of Action	SME	Subject Matter Expert
COP	Contingency Plan	SOW	Statement of Work
COS	Chief of Staff	STA	Secondary Training Audience
Div	Division	TF	Task Force

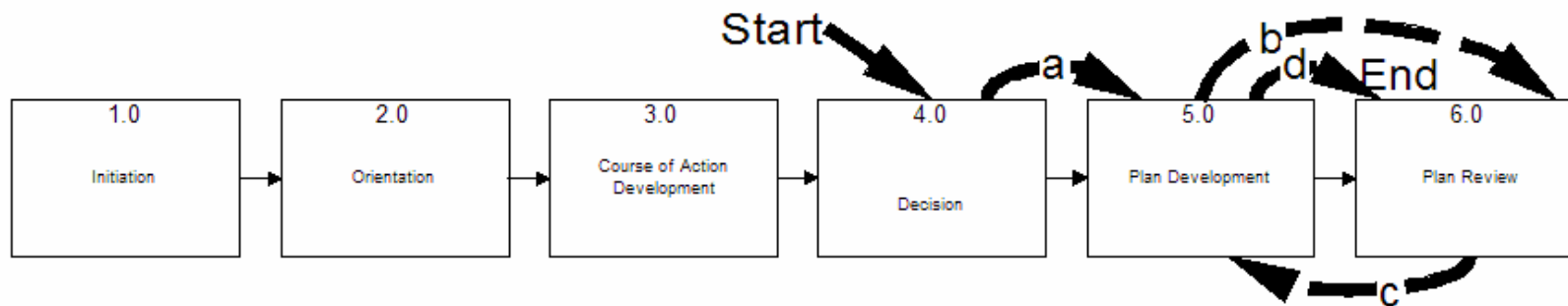


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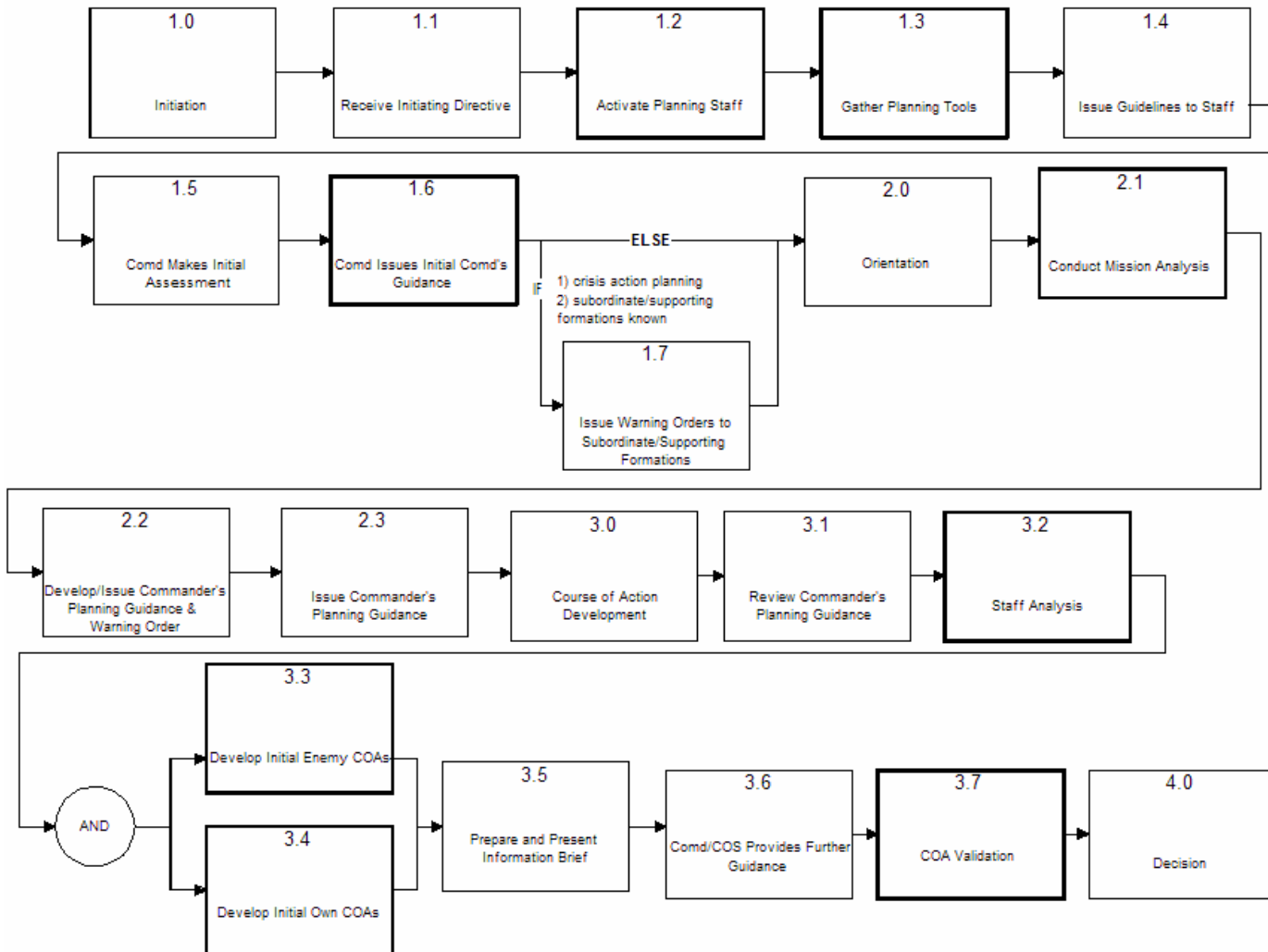
## **Annex A: Mapping of Functions Observed During EX VIRTUAL RAM to Doctrinal Functions**



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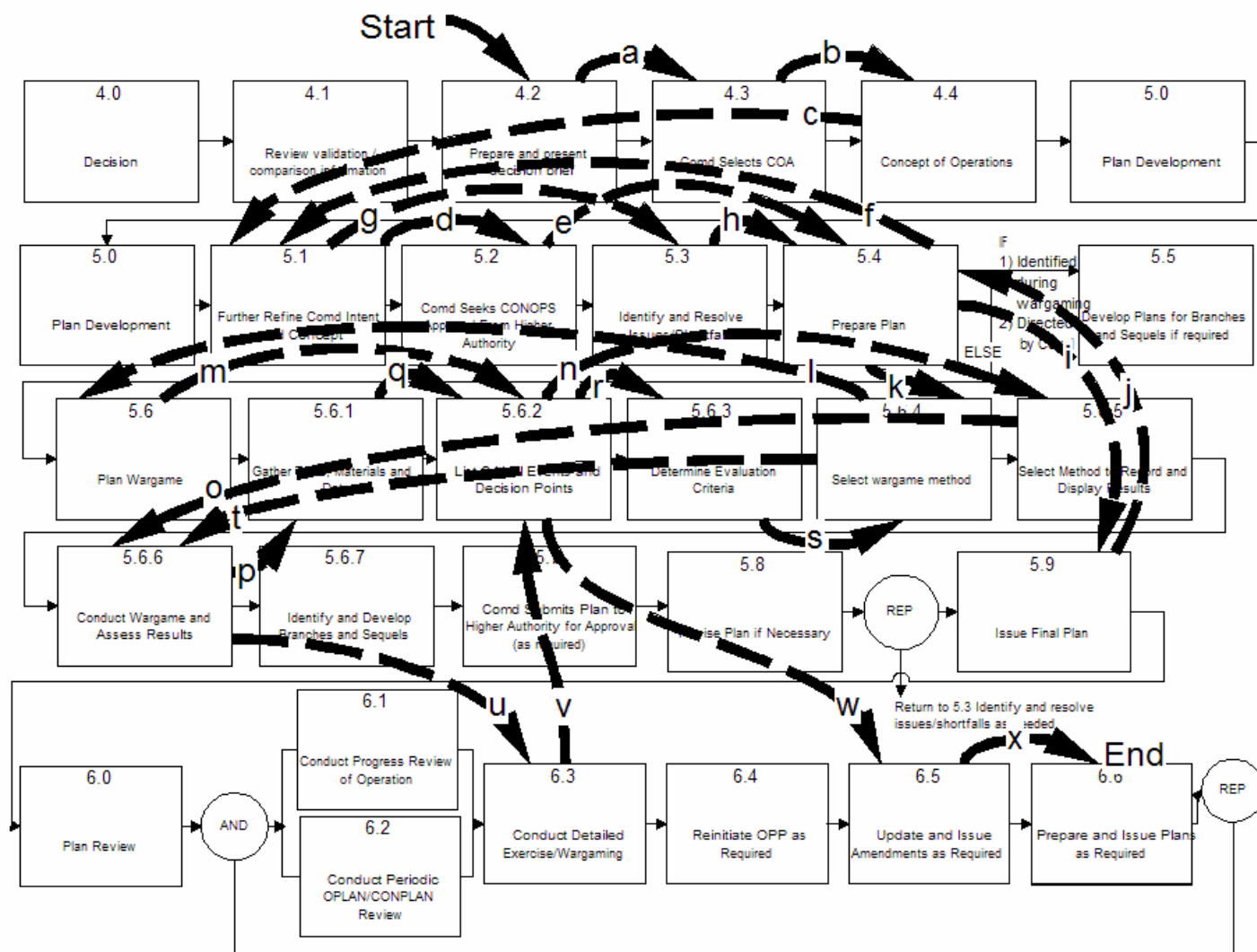
Function flow between top level doctrinal OPP functions (during planning cycle 1)



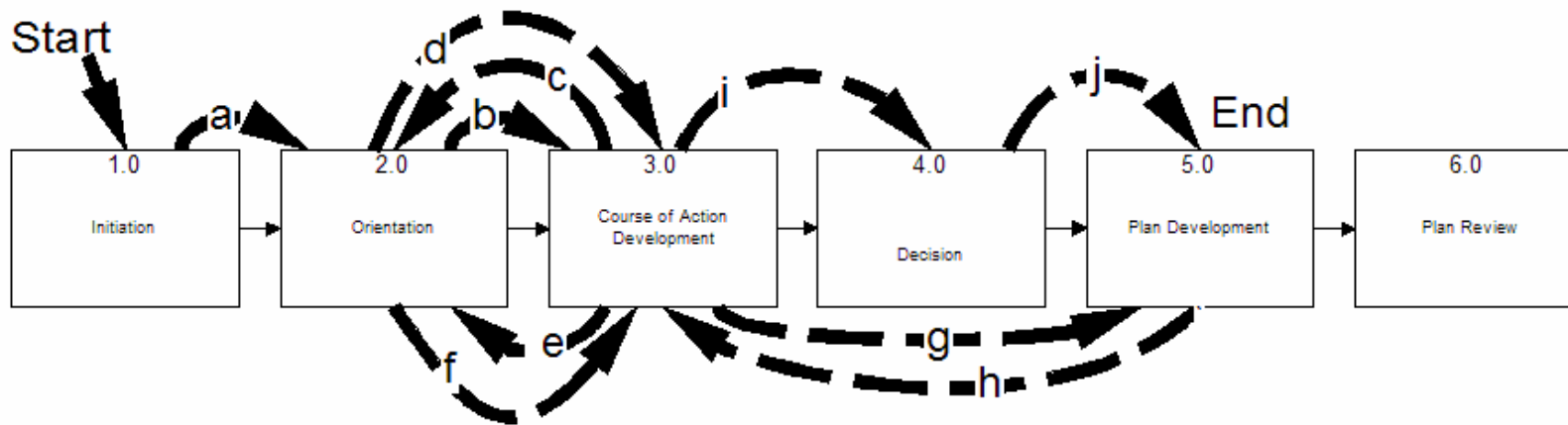
Function flow between second level doctrinal OPP functions (during planning cycle 1)







Function flow between third and fourth level doctrinal OPP functions (during planning cycle 1, continued)

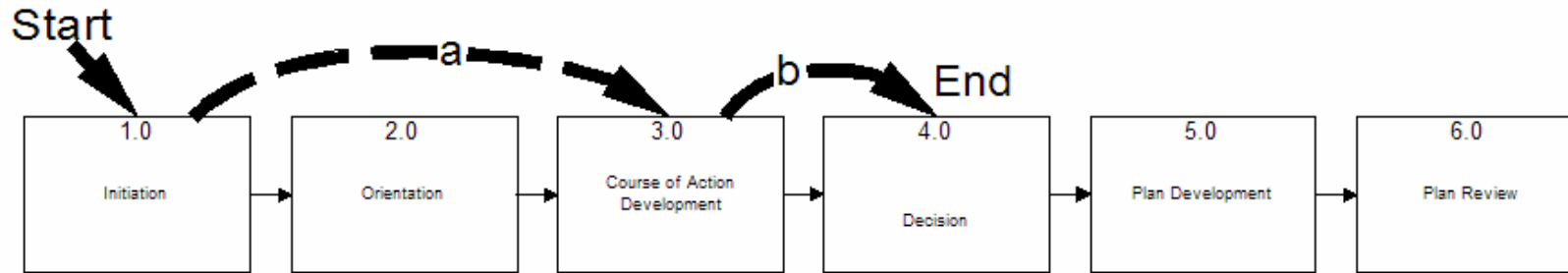


Function flow between top level doctrinal OPP functions (during planning cycle 2)

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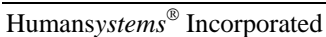
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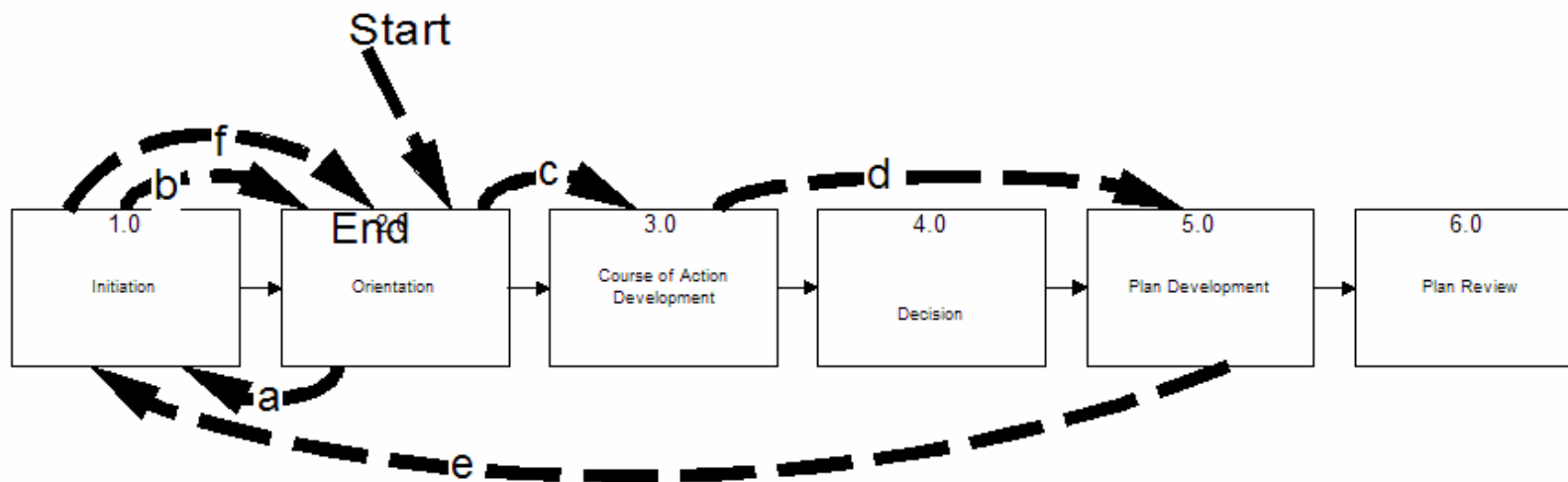


Function flow between top level doctrinal OPP functions (during planning cycle 3)

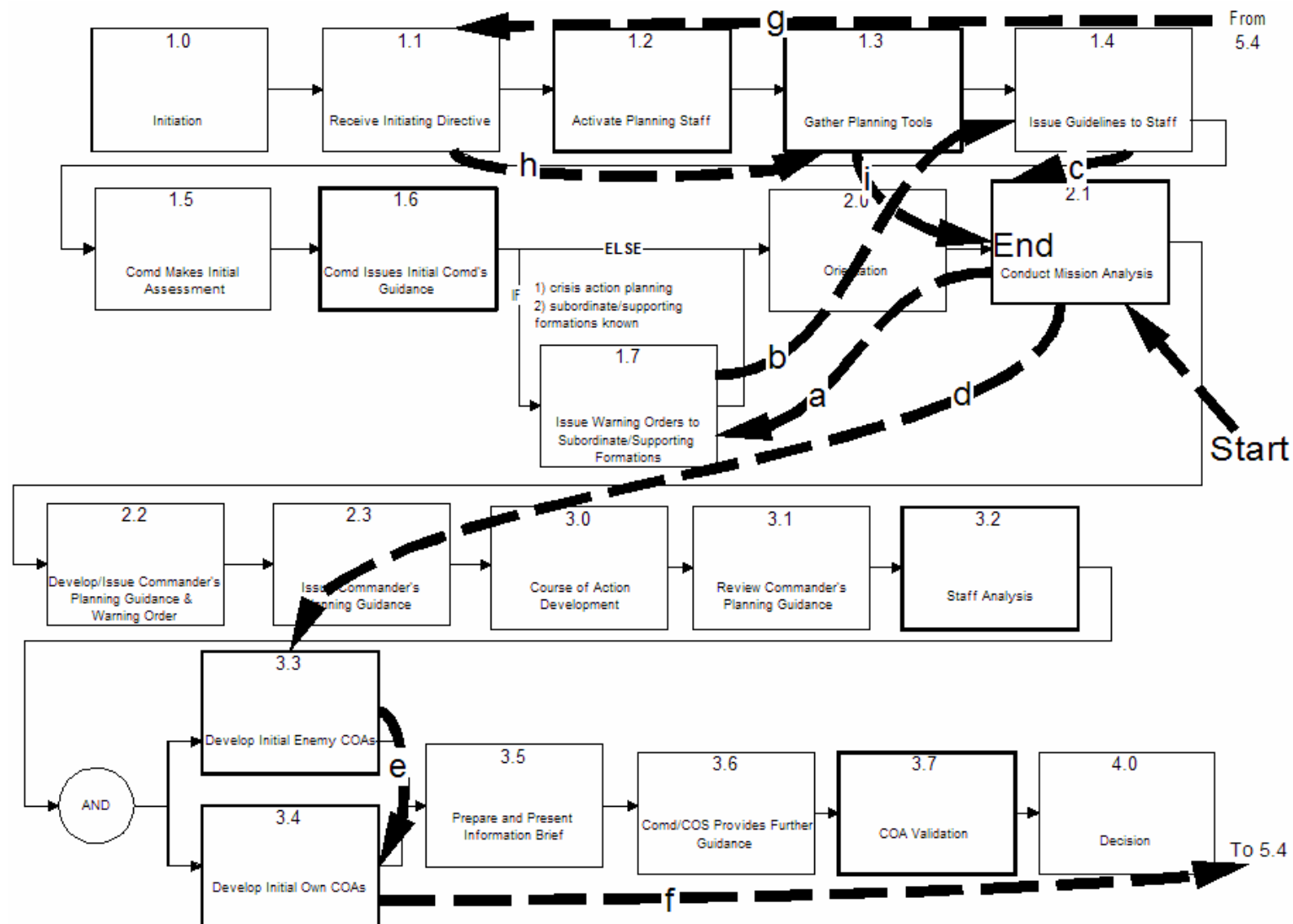








Function flow between top level doctrinal OPP functions (during planning cycle 4)



Function flow between second level doctrinal OPP functions (during planning cycle 4)

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## Annex B: Function Listing

### Cycle 1

- 4.2 Prepare and present decision brief
- 4.3 Comd selects COA
- 4.4 Concept of Operations
- 5.1 Further refine Comd intent and concept
- 5.2 Comd seeks CONOPS approval from higher authority
- 5.4 Prepare plan
- 5.1 Further refine Comd intent and concept
- 5.3 Identify and resolve issues/shortfalls
- 5.4 Prepare plan
- 5.9 Issue final plan
- 5.4 Prepare plan
- 5.6.4 Select wargame method
- 5.6 Plan wargame
- 5.6.2 List critical events and decision points
- 5.6.5 Select method to record and display results
- 5.6.6 Conduct wargame and assess results
- 5.6.1 Gather tools, materials and data
- 5.6.2 List critical events and decision points
- 5.6.3 Determine evaluation criteria
- 5.6.4 Select wargame method
- 5.6.6 Conduct wargame and assess results
- 6.3 Conduct detailed exercise / wargaming
- 5.6.2 List critical events and decision points
- 6.5 Update and issue amendments as required
- 6.6 Prepare and issue plans as required

### Cycle 2

- 1.2 Activate planning staff
- 1.4 Issue guidelines to staff
- 1.5 Comd makes initial assessment
- 1.6 Comd issues initial comd's guidance
- 1.6.1 Provide guidance on how to abbreviate OPP
- 1.6.2 Provide guidance on initial time allocation
- 1.6.6 Provide guidance on additional tasks
- 2.0 ORIENTATION
- 2.1.2.5 Review tasks (assigned/implied)
- 2.1.1.4 Review enemy forces
- 2.1.2.5 Review tasks (assigned/implied)
- 2.1.1.3 Review geographic factors
- 3.4 Develop initial own COAs
- 3.1 Review Commander's Planning Guidance
- 3.2 Staff analysis
- 3.2.1.3 Analyze political considerations
- 3.2.1.7 Analyze logistics and movement
- 3.7 COA validation
- 3.7.3 Continue staff checks and analyses of own COAs
- 3.7.1 Consider additional planning guidance from commander
- 3.2.1.7 Analyze logistics and movement
- 3.2.1.5 Analyze time and space



## 2.0 ORIENTATION

### 2.1.1 Review situation

#### 2.1.1.3 Review geographic factors

### 2.1.2 Review higher level information

#### 2.1.3 Develop own information based on higher level info

#### 2.1.3.4 Consider own proposed timeline

#### 2.1.3.5 Develop own critical factors/assumptions

#### 2.1.3 Develop own information based on higher level info

### 3.1 Review Commander's Planning Guidance

### 3.2 Staff analysis

#### 3.2.1 Analyze factors & make deductions

##### 3.2.1.1 Analyze area of operations

##### 3.2.1.2 Analyze opposing force capabilities

##### 3.2.1.3 Analyze political considerations

##### 3.2.1.4 Analyze own force capabilities

#### 2.1.3.5 Develop own critical factors/assumptions

#### 2.1.3.8 Develop own tasks (assigned/implied)

##### 3.2.1.2 Analyze opposing force capabilities

##### 3.2.1.4 Analyze own force capabilities

##### 3.2.1.5 Analyze time and space

### 3.3 Develop initial enemy COAs

#### 3.3.1 Synthesize accumulated intelligence

#### 3.3.2 Determine advantages/disadvantages to enemy for each COA

#### 3.3.3 Deduce enemy COAs (most likely and most dangerous at minimum)

### 3.4 Develop initial own COAs

#### 3.4.1 Develop way to accomplish tasks associated with mission

#### 3.4.5 Identify broad component level missions/tasks

#### 3.4.8 Determine preliminary command and organizational relationships

##### 3.2.1.1 Analyze area of operations

##### 3.2.1.2 Analyze opposing force capabilities

##### 3.2.1.3 Analyze political considerations

#### 3.7.2 Refine COAs selected by commander

##### 3.2.1.7 Analyze logistics and movement

#### 3.7.5.4 Wargaming

#### 3.7.5.6 List critical events and decision points

#### 3.7.5.8 Select wargame method

#### 3.7.2 Refine COAs selected by commander

#### 3.7.3.2 Continue to validate previous deductions

#### 3.7.5.4 Wargaming

#### 3.7.5.5 Gather tools, materials and data

#### 3.7.5.7 Determine evaluation criteria

#### 3.7.5.9 Select method to record and display results

#### 3.7.5.10 Conduct wargame and assess results

### 5.2 Comd seeks CONOPS approval from higher authority

### 5.4 Prepare plan

#### 5.1 Further refine Comd intent and concept

### 5.4 Prepare plan

#### 3.7.2 Refine COAs selected by commander

#### 3.7.3 Continue staff checks and analyses of own COAs

##### 3.7.3.1 Continue developing factors and deductions

- 4.2 Prepare and present decision brief
- 4.3 Comd selects COA
- 4.4 Concept of Operations
- 5.1 Further refine Comd intent and concept
- 5.9 Issue final plan

### **Cycle 3**

- 1.1 Receive initiating directive
- 1.3.1 Gather higher Comd's order or plan, with graphics
- 1.4 Issue guidelines to staff
- 1.5 Comd makes initial assessment
- 1.6 Comd issues initial comd's guidance
  - 1.6.1 Provide guidance on how to abbreviate OPP
- 3.2 Staff analysis
  - 3.2.1 Analyze factors & make deductions
    - 3.2.1.2 Analyze opposing force capabilities
    - 3.2.1.4 Analyze own force capabilities
    - 3.2.1.5 Analyze time and space
- 3.4 Develop initial own COAs
  - 3.4.1 Develop way to accomplish tasks associated with mission
  - 3.4.4 Scope out possible phases of COA & initial sequencing of forces
  - 3.4.5 Identify broad component level missions/tasks
  - 3.4.6 Describe COA in statement supported by sketches
- 4.2 Prepare and present decision brief

### **Cycle 4**

- 2.1.1 Review situation
  - 2.1.2.2 Review higher constraints/restraints
  - 2.1.2.5 Review tasks (assigned/implied)
  - 2.1.3.6 Develop own constraints/restraints
  - 2.1.3.8 Develop own tasks (assigned/implied)
- 1.7 Issue warning orders to subordinate/supporting formations
- 1.4 Issue guidelines to staff
- 2.1 Conduct mission analysis
- 3.3 Develop initial enemy COAs
- 3.4 Develop initial own COAs
  - 3.4.1 Develop way to accomplish tasks associated with mission
  - 3.4.4 Scope out possible phases of COA & initial sequencing of forces
  - 3.4.5 Identify broad component level missions/tasks
  - 3.4.6 Describe COA in statement supported by sketches
- 5.4 Prepare plan
- 1.1 Receive initiating directive
- 1.3.1 Gather higher Comd's order or plan, with graphics
- 2.1.5 Prepare mission analysis brief
  - 2.1.5.1 Summarize directives
  - 2.1.5.2 Summarize decisions
  - 2.1.5.3 Summarize initial concerns
  - 2.1.5.4 Describe mission as perceived by the commander



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## **Annex C: Overview of Functions for Four Planning Cycles**



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# Cycle 1

1.0 INITIATION	2.1.1.5 Review own forces	2.1.5.3 Summarize initial concerns	3.4.4 Scope out possible phases of COA & initial sequencing of forces	3.7.5.10 Conduct wargame and assess results
1.1 Receive initiating directive	2.1.1.6 Review administrative factors	2.1.5.4 Describe mission as perceived by the commander	3.4.5 Identify broad component level missions/tasks	3.7.5.11 Identify branches and sequels
1.2 Activate planning staff	2.1.1.7 Review logistic factors	2.1.5.5 Deliver mission analysis briefing	3.4.6 Describe COA in statement supported by sketches	4.0 DECISION
1.2.1 Designate planning staff	2.1.1.8 Review command and control factors	2.1.5.6 Receive additional guidance from commander	3.4.7 Test viability of own COAs	4.1 Review validation/comparison information
1.2.2 Notify planning staff	2.1.2 Review higher level information	2.1.5.7 Finalize mission statement	3.4.7.1 Assess suitability of each COA	4.2 Prepare and present decision brief
1.2.3 Activate planning staff	2.1.2.1 Review higher critical facts and assumptions	2.2 Develop CPG	3.4.7.2 Assess feasibility of each COA	4.3 Comd selects COA
1.2.4 Establish staff contacts with higher formations	2.1.2.2 Review higher constraints/restraints	2.3 Issue CPG	3.4.7.3 Assess acceptability of each COA	4.4 Concept of Operations
1.2.5 Establish staff contacts with subordinate formations	2.1.2.3 Consider key strengths and weaknesses (own and enemy)	3.0 COURSE OF ACTION DEVELOPMENT	3.4.7.4 Assess exclusivity of each COA	5.0 PLAN DEVELOPMENT
1.3 Gather planning tools	2.1.2.4 Review own & enemy higher centres of gravity	3.1 Review Commander's Planning Guidance	3.4.7.5 Assess completeness of each COA	5.1 Further refine Comd intent and concept
1.3.1 Gather higher Comd's order or plan, with graphics	2.1.2.5 Review tasks (assigned/implied)	3.2 Staff analysis	3.4.8 Determine preliminary command and organizational relationships	5.2 Comd seeks CONOPS approval from higher authority
1.3.2 Gather maps/charts & electronic geomatic media on area of operations	2.1.2.6 Review objectives	3.2.1 Analyze factors & make deductions	3.4.9 Measure own courses against enemy COA, principles of war, etc.	5.3 Identify and resolve issues/shortfalls
1.3.3 Gather SOPs	2.1.2.7 Review end state	3.2.1.1 Analyze area of operations	3.5 Prepare and present information brief	5.4 Prepare plan
1.3.4 Gather appropriate publications and documentation	2.1.2.8 Review criteria for success	3.2.1.2 Analyze opposing force capabilities	3.6 Comd/COS provides further guidance	5.5 Develop plans for branches and sequels if required
1.4 Issue guidelines to staff	2.1.3 Develop own information based on higher level info	3.2.1.3 Analyze political considerations	3.7 COA validation	5.6 Plan wargame
1.5 Comd makes initial assessment	2.1.3.1 Consider own force capabilities and groupings	3.2.1.4 Analyze own force capabilities	3.7.1 Consider additional planning guidance from commander	5.6.1 Gather tools, materials and data
1.6 Comd issues initial comd's guidance	2.1.3.2 Consider own command and control structure required	3.2.1.5 Analyze time and space	3.7.2 Refine COAs selected by commander	5.6.2 List critical events and decision points
1.6.1 Provide guidance on how to abbreviate OPP	2.1.3.3 Assess own risk	3.2.1.6 Analyze command and control	3.7.3 Continue staff checks and analyses of own COAs	5.6.3 Determine evaluation criteria
1.6.2 Provide guidance on initial time allocation	2.1.3.4 Consider own proposed timeline	3.2.1.7 Analyze logistics and movement	3.7.3.1 Continue developing factors and deductions	5.6.4 Select wargame method
1.6.3 Provide guidance on liaison officers to dispatch	2.1.3.5 Develop own critical factors/assumptions	3.2.1.8 Analyze rules of engagement	3.7.3.2 Continue to validate previous deductions	5.6.5 Select method to record and display results
1.6.4 Provide guidance on initial reconnaissance to begin	2.1.3.6 Develop own constraints/restraints	3.2.1.9 Analyze conflict termination	3.7.4 Develop new COAs directed by Commander	5.6.6 Conduct wargame and assess results
1.6.5 Provide guidance on authorized movement	2.1.3.7 Develop own & enemy centres of gravity	3.2.1.10 Analyze risk	3.7.5 Compare own COAs	5.6.7 Identify branches and sequels
1.6.6 Provide guidance on additional tasks	2.1.3.8 Develop own tasks (assigned/implied)	3.2.1.11 Analyze assigned/implied tasks	3.7.5.1 Criteria comparison	5.7 Comd submits plan to higher authority for approval (as required)
1.7 Issue warning orders to subordinate/supporting formations	2.1.3.9 Develop own objectives	3.3 Develop initial enemy COAs	3.7.5.2 Select and create matrix comparison	5.8 Revise plan if necessary
2.0 ORIENTATION	2.1.3.10 Develop own end states	3.3.1 Synthesize accumulated intelligence	3.7.5.3 Intuitive comparison	5.9 Issue final plan
2.1 Conduct mission analysis	2.1.3.11 Develop own criteria for success	3.3.2 Determine advantages/disadvantages to enemy for each COA	3.7.5.4 Wargaming	6.0 PLAN REVIEW
2.1.1 Review situation	2.1.3.12 Develop own battlespace effects	3.3.3 Deduce enemy COAs (most likely and most dangerous at minimum)	3.7.5.5 Gather tools, materials and data	6.1 Conduct progress review of operation
2.1.1.1 Review environmental factors	2.1.4 Develop mission statement	3.4 Develop initial own COAs	3.7.5.6 List critical events and decision points	6.2 Conduct periodic OPLAN/CONPLAN review
2.1.1.2 Review political factors	2.1.5 Prepare mission analysis brief	3.4.1 Develop way to accomplish tasks associated with mission	3.7.5.7 Determine evaluation criteria	6.3 Conduct detailed exercise / wargaming
2.1.1.3 Review geographic factors	2.1.5.1 Summarize directives	3.4.2 Integrate and synchronize ideas in terms of principles of joint warfare	3.7.5.8 Select wargame method	6.4 Reinitiate OPP as required
2.1.1.4 Review enemy forces	2.1.5.2 Summarize decisions	3.4.3 Ensure focus of COGs is maintained	3.7.5.9 Select method to record and display results	6.5 Update and issue amendments as required
				6.6 Prepare and issue plans as required

## Cycle 2

1.0 INITIATION	2.1.1.5 Review own forces	2.1.5.3 Summarize initial concerns	3.4.4 Scope out possible phases of COA & initial sequencing of forces	3.7.5.10 Conduct wargame and assess results
1.1 Receive initiating directive	2.1.1.6 Review administrative factors	2.1.5.4 Describe mission as perceived by the commander	3.4.5 Identify broad component level missions/tasks	3.7.5.11 Identify branches and sequels
1.2 Activate planning staff	2.1.1.7 Review logistic factors	2.1.5.5 Deliver mission analysis briefing	3.4.6 Describe COA in statement supported by sketches	4.0 DECISION
1.2.1 Designate planning staff	2.1.1.8 Review command and control factors	2.1.5.6 Receive additional guidance from commander	3.4.7 Test viability of own COAs	4.1 Review validation/comparison information
1.2.2 Notify planning staff	2.1.2 Review higher level information	2.1.5.7 Finalize mission statement	3.4.7.1 Assess suitability of each COA	4.2 Prepare and present decision brief
1.2.3 Activate planning staff	2.1.2.1 Review higher critical facts and assumptions	2.2 Develop CPG	3.4.7.2 Assess feasibility of each COA	4.3 Comd selects COA
1.2.4 Establish staff contacts with higher formations	2.1.2.2 Review higher constraints/restraints	2.3 Issue CPG	3.4.7.3 Assess acceptability of each COA	4.4 Concept of Operations
1.2.5 Establish staff contacts with subordinate formations	2.1.2.3 Consider key strengths and weaknesses (own and enemy)	3.0 COURSE OF ACTION DEVELOPMENT	3.4.7.4 Assess exclusivity of each COA	5.0 PLAN DEVELOPMENT
1.3 Gather planning tools	2.1.2.4 Review own & enemy higher centres of gravity	3.1 Review Commander's Planning Guidance	3.4.7.5 Assess completeness of each COA	5.1 Further refine Comd intent and concept
1.3.1 Gather higher Comd's order or plan, with graphics	2.1.2.5 Review tasks (assigned/implicit)	3.2 Staff analysis	3.4.8 Determine preliminary command and organizational relationships	5.2 Comd seeks CONOPS approval from higher authority
1.3.2 Gather maps/charts & electronic geomatic media on area of operations	2.1.2.6 Review objectives	3.2.1 Analyze factors & make deductions	3.4.9 Measure own courses against enemy COA, principles of war, etc.	5.3 Identify and resolve issues/shortfalls
1.3.3 Gather SOPs	2.1.2.7 Review end state	3.2.1.1 Analyze area of operations	3.5 Prepare and present information brief	5.4 Prepare plan
1.3.4 Gather appropriate publications and documentation	2.1.2.8 Review criteria for success	3.2.1.2 Analyze opposing force capabilities	3.6 Comd/COS provides further guidance	5.5 Develop plans for branches and sequels if required
1.4 Issue guidelines to staff	2.1.3 Develop own information based on higher level info	3.2.1.3 Analyze political considerations	3.7 COA validation	5.6 Plan wargame
1.5 Comd makes initial assessment	2.1.3.1 Consider own force capabilities and groupings	3.2.1.4 Analyze own force capabilities	3.7.1 Consider additional planning guidance from commander	5.6.1 Gather tools, materials and data
1.6 Comd issues initial comd's guidance	2.1.3.2 Consider own command and control structure required	3.2.1.5 Analyze time and space	3.7.2 Refine COAs selected by commander	5.6.2 List critical events and decision points
1.6.1 Provide guidance on how to abbreviate OPP	2.1.3.3 Assess own risk	3.2.1.6 Analyze command and control	3.7.3 Continue staff checks and analyses of own COAs	5.6.3 Determine evaluation criteria
1.6.2 Provide guidance on initial time allocation	2.1.3.4 Consider own proposed timeline	3.2.1.7 Analyze logistics and movement	3.7.3.1 Continue developing factors and deductions	5.6.4 Select wargame method
1.6.3 Provide guidance on liaison officers to dispatch	2.1.3.5 Develop own critical factors/assumptions	3.2.1.8 Analyze rules of engagement	3.7.3.2 Continue to validate previous deductions	5.6.5 Select method to record and display results
1.6.4 Provide guidance on initial reconnaissance to begin	2.1.3.6 Develop own constraints/restraints	3.2.1.9 Analyze conflict termination	3.7.4 Develop new COAs directed by Commander	5.6.6 Conduct wargame and assess results
1.6.5 Provide guidance on authorized movement	2.1.3.7 Develop own & enemy centres of gravity	3.2.1.10 Analyze risk	3.7.5 Compare own COAs	5.6.7 Identify branches and sequels
1.6.6 Provide guidance on additional tasks	2.1.3.8 Develop own tasks (assigned/implicit)	3.2.1.11 Analyze assigned/implicit tasks	3.7.5.1 Criteria comparison	5.7 Comd submits plan to higher authority for approval (as required)
1.7 Issue warning orders to subordinate/supporting formations	2.1.3.9 Develop own objectives	3.3 Develop initial enemy COAs	3.7.5.2 Select and create matrix comparison	5.8 Revise plan if necessary
2.0 ORIENTATION	2.1.3.10 Develop own end states	3.3.1 Synthesize accumulated intelligence	3.7.5.3 Intuitive comparison	5.9 Issue final plan
2.1 Conduct mission analysis	2.1.3.11 Develop own criteria for success	3.3.2 Determine advantages/disadvantages to enemy for each COA	3.7.5.4 Wargaming	6.0 PLAN REVIEW
2.1.1 Review situation	2.1.3.12 Develop own battlespace effects	3.3.3 Deduce enemy COAs (most likely and most dangerous at minimum)	3.7.5.5 Gather tools, materials and data	6.1 Conduct progress review of operation
2.1.1.1 Review environmental factors	2.1.4 Develop mission statement	3.4 Develop initial own COAs	3.7.5.6 List critical events and decision points	6.2 Conduct periodic OPLAN/CONPLAN review
2.1.1.2 Review political factors	2.1.5 Prepare mission analysis brief	3.4.1 Develop way to accomplish tasks associated with mission	3.7.5.7 Determine evaluation criteria	6.3 Conduct detailed exercise / wargaming
2.1.1.3 Review geographic factors	2.1.5.1 Summarize directives	3.4.2 Integrate and synchronize ideas in terms of principles of joint warfare	3.7.5.8 Select wargame method	6.4 Reinitiate OPP as required
2.1.1.4 Review enemy forces	2.1.5.2 Summarize decisions	3.4.3 Ensure focus of COGs is maintained	3.7.5.9 Select method to record and display results	6.5 Update and issue amendments as required
				6.6 Prepare and issue plans as required

## Cycle 3

1.0 INITIATION	2.1.1.5 Review own forces	2.1.5.3 Summarize initial concerns	3.4.4 Scope out possible phases of COA & initial sequencing of forces	3.7.5.10 Conduct wargame and assess results
1.1 Receive initiating directive	2.1.1.6 Review administrative factors	2.1.5.4 Describe mission as perceived by the commander	3.4.5 Identify broad component level missions/tasks	3.7.5.11 Identify branches and sequels
1.2 Activate planning staff	2.1.1.7 Review logistic factors	2.1.5.5 Deliver mission analysis briefing	3.4.6 Describe COA in statement supported by sketches	4.0 DECISION
1.2.1 Designate planning staff	2.1.1.8 Review command and control factors	2.1.5.6 Receive additional guidance from commander	3.4.7 Test viability of own COAs	4.1 Review validation/comparison information
1.2.2 Notify planning staff	2.1.2 Review higher level information	2.1.5.7 Finalize mission statement	3.4.7.1 Assess suitability of each COA	4.2 Prepare and present decision brief
1.2.3 Activate planning staff	2.1.2.1 Review higher critical facts and assumptions	2.2 Develop CPG	3.4.7.2 Assess feasibility of each COA	4.3 Comd selects COA
1.2.4 Establish staff contacts with higher formations	2.1.2.2 Review higher constraints/restraints	2.3 Issue CPG	3.4.7.3 Assess acceptability of each COA	4.4 Concept of Operations
1.2.5 Establish staff contacts with subordinate formations	2.1.2.3 Consider key strengths and weaknesses (own and enemy)	3.0 COURSE OF ACTION DEVELOPMENT	3.4.7.4 Assess exclusivity of each COA	5.0 PLAN DEVELOPMENT
1.3 Gather planning tools	2.1.2.4 Review own & enemy higher centres of gravity	3.1 Review Commander's Planning Guidance	3.4.7.5 Assess completeness of each COA	5.1 Further refine Comd intent and concept
1.3.1 Gather higher Comd's order or plan, with graphics	2.1.2.5 Review tasks (assigned/implicit)	3.2 Staff analysis	3.4.8 Determine preliminary command and organizational relationships	5.2 Comd seeks CONOPS approval from higher authority
1.3.2 Gather maps/charts & electronic geomatic media on area of operations	2.1.2.6 Review objectives	3.2.1 Analyze factors & make deductions	3.4.9 Measure own courses against enemy COA, principles of war, etc.	5.3 Identify and resolve issues/shortfalls
1.3.3 Gather SOPs	2.1.2.7 Review end state	3.2.1.1 Analyze area of operations	3.5 Prepare and present information brief	5.4 Prepare plan
1.3.4 Gather appropriate publications and documentation	2.1.2.8 Review criteria for success	3.2.1.2 Analyze opposing force capabilities	3.6 Comd/COS provides further guidance	5.5 Develop plans for branches and sequels if required
1.4 Issue guidelines to staff	2.1.3 Develop own information based on higher level info	3.2.1.3 Analyze political considerations	3.7 COA validation	5.6 Plan wargame
1.5 Comd makes initial assessment	2.1.3.1 Consider own force capabilities and groupings	3.2.1.4 Analyze own force capabilities	3.7.1 Consider additional planning guidance from commander	5.6.1 Gather tools, materials and data
1.6 Comd issues initial comd's guidance	2.1.3.2 Consider own command and control structure required	3.2.1.5 Analyze time and space	3.7.2 Refine COAs selected by commander	5.6.2 List critical events and decision points
1.6.1 Provide guidance on how to abbreviate OPP	2.1.3.3 Assess own risk	3.2.1.6 Analyze command and control	3.7.3 Continue staff checks and analyses of own COAs	5.6.3 Determine evaluation criteria
1.6.2 Provide guidance on initial time allocation	2.1.3.4 Consider own proposed timeline	3.2.1.7 Analyze logistics and movement	3.7.3.1 Continue developing factors and deductions	5.6.4 Select wargame method
1.6.3 Provide guidance on liaison officers to dispatch	2.1.3.5 Develop own critical factors/assumptions	3.2.1.8 Analyze rules of engagement	3.7.3.2 Continue to validate previous deductions	5.6.5 Select method to record and display results
1.6.4 Provide guidance on initial reconnaissance to begin	2.1.3.6 Develop own constraints/restraints	3.2.1.9 Analyze conflict termination	3.7.4 Develop new COAs directed by Commander	5.6.6 Conduct wargame and assess results
1.6.5 Provide guidance on authorized movement	2.1.3.7 Develop own & enemy centres of gravity	3.2.1.10 Analyze risk	3.7.5 Compare own COAs	5.6.7 Identify branches and sequels
1.6.6 Provide guidance on additional tasks	2.1.3.8 Develop own tasks (assigned/implicit)	3.2.1.11 Analyze assigned/implicit tasks	3.7.5.1 Criteria comparison	5.7 Comd submits plan to higher authority for approval (as required)
1.7 Issue warning orders to subordinate/supporting formations	2.1.3.9 Develop own objectives	3.3 Develop initial enemy COAs	3.7.5.2 Select and create matrix comparison	5.8 Revise plan if necessary
2.0 ORIENTATION	2.1.3.10 Develop own end states	3.3.1 Synthesize accumulated intelligence	3.7.5.3 Intuitive comparison	5.9 Issue final plan
2.1 Conduct mission analysis	2.1.3.11 Develop own criteria for success	3.3.2 Determine advantages/disadvantages to enemy for each COA	3.7.5.4 Wargaming	6.0 PLAN REVIEW
2.1.1 Review situation	2.1.3.12 Develop own battlespace effects	3.3.3 Deduce enemy COAs (most likely and most dangerous at minimum)	3.7.5.5 Gather tools, materials and data	6.1 Conduct progress review of operation
2.1.1.1 Review environmental factors	2.1.4 Develop mission statement	3.4 Develop initial own COAs	3.7.5.6 List critical events and decision points	6.2 Conduct periodic OPLAN/CONPLAN review
2.1.1.2 Review political factors	2.1.5 Prepare mission analysis brief	3.4.1 Develop way to accomplish tasks associated with mission	3.7.5.7 Determine evaluation criteria	6.3 Conduct detailed exercise / wargaming
2.1.1.3 Review geographic factors	2.1.5.1 Summarize directives	3.4.2 Integrate and synchronize ideas in terms of principles of joint warfare	3.7.5.8 Select wargame method	6.4 Reinitiate OPP as required
2.1.1.4 Review enemy forces	2.1.5.2 Summarize decisions	3.4.3 Ensure focus of COGs is maintained	3.7.5.9 Select method to record and display results	6.5 Update and issue amendments as required
				6.6 Prepare and issue plans as required

## Cycle 4

1.0 INITIATION	2.1.1.5 Review own forces	2.1.5.3 Summarize initial concerns	3.4.4 Scope out possible phases of COA & initial sequencing of forces	3.7.5.10 Conduct wargame and assess results
1.1 Receive initiating directive	2.1.1.6 Review administrative factors	2.1.5.4 Describe mission as perceived by the commander	3.4.5 Identify broad component level missions/tasks	3.7.5.11 Identify branches and sequels
1.2 Activate planning staff	2.1.1.7 Review logistic factors	2.1.5.5 Deliver mission analysis briefing	3.4.6 Describe COA in statement supported by sketches	4.0 DECISION
1.2.1 Designate planning staff	2.1.1.8 Review command and control factors	2.1.5.6 Receive additional guidance from commander	3.4.7 Test viability of own COAs	4.1 Review validation/comparison information
1.2.2 Notify planning staff	2.1.2 Review higher level information	2.1.5.7 Finalize mission statement	3.4.7.1 Assess suitability of each COA	4.2 Prepare and present decision brief
1.2.3 Activate planning staff	2.1.2.1 Review higher critical facts and assumptions	2.2 Develop CPG	3.4.7.2 Assess feasibility of each COA	4.3 Comd selects COA
1.2.4 Establish staff contacts with higher formations	2.1.2.2 Review higher constraints/restraints	2.3 Issue CPG	3.4.7.3 Assess acceptability of each COA	4.4 Concept of Operations
1.2.5 Establish staff contacts with subordinate formations	2.1.2.3 Consider key strengths and weaknesses (own and enemy)	3.0 COURSE OF ACTION DEVELOPMENT	3.4.7.4 Assess exclusivity of each COA	5.0 PLAN DEVELOPMENT
1.3 Gather planning tools	2.1.2.4 Review own & enemy higher centres of gravity	3.1 Review Commander's Planning Guidance	3.4.7.5 Assess completeness of each COA	5.1 Further refine Comd intent and concept
1.3.1 Gather higher Comd's order or plan, with graphics	2.1.2.5 Review tasks (assigned/implied)	3.2 Staff analysis	3.4.8 Determine preliminary command and organizational relationships	5.2 Comd seeks CONOPS approval from higher authority
1.3.2 Gather maps/charts & electronic geomatic media on area of operations	2.1.2.6 Review objectives	3.2.1 Analyze factors & make deductions	3.4.9 Measure own courses against enemy COA, principles of war, etc.	5.3 Identify and resolve issues/shortfalls
1.3.3 Gather SOPs	2.1.2.7 Review end state	3.2.1.1 Analyze area of operations	3.5 Prepare and present information brief	5.4 Prepare plan
1.3.4 Gather appropriate publications and documentation	2.1.2.8 Review criteria for success	3.2.1.2 Analyze opposing force capabilities	3.6 Comd/COS provides further guidance	5.5 Develop plans for branches and sequels if required
1.4 Issue guidelines to staff	2.1.3 Develop own information based on higher level info	3.2.1.3 Analyze political considerations	3.7 COA validation	5.6 Plan wargame
1.5 Comd makes initial assessment	2.1.3.1 Consider own force capabilities and groupings	3.2.1.4 Analyze own force capabilities	3.7.1 Consider additional planning guidance from commander	5.6.1 Gather tools, materials and data
1.6 Comd issues initial comd's guidance	2.1.3.2 Consider own command and control structure required	3.2.1.5 Analyze time and space	3.7.2 Refine COAs selected by commander	5.6.2 List critical events and decision points
1.6.1 Provide guidance on how to abbreviate OPP	2.1.3.3 Assess own risk	3.2.1.6 Analyze command and control	3.7.3 Continue staff checks and analyses of own COAs	5.6.3 Determine evaluation criteria
1.6.2 Provide guidance on initial time allocation	2.1.3.4 Consider own proposed timeline	3.2.1.7 Analyze logistics and movement	3.7.3.1 Continue developing factors and deductions	5.6.4 Select wargame method
1.6.3 Provide guidance on liaison officers to dispatch	2.1.3.5 Develop own critical factors/assumptions	3.2.1.8 Analyze rules of engagement	3.7.3.2 Continue to validate previous deductions	5.6.5 Select method to record and display results
1.6.4 Provide guidance on initial reconnaissance to begin	2.1.3.6 Develop own constraints/restraints	3.2.1.9 Analyze conflict termination	3.7.4 Develop new COAs directed by Commander	5.6.6 Conduct wargame and assess results
1.6.5 Provide guidance on authorized movement	2.1.3.7 Develop own & enemy centres of gravity	3.2.1.10 Analyze risk	3.7.5 Compare own COAs	5.6.7 Identify branches and sequels
1.6.6 Provide guidance on additional tasks	2.1.3.8 Develop own tasks (assigned/implied)	3.2.1.11 Analyze assigned/implied tasks	3.7.5.1 Criteria comparison	5.7 Comd submits plan to higher authority for approval (as required)
1.7 Issue warning orders to subordinate/supporting formations	2.1.3.9 Develop own objectives	3.3 Develop initial enemy COAs	3.7.5.2 Select and create matrix comparison	5.8 Revise plan if necessary
2.0 ORIENTATION	2.1.3.10 Develop own end states	3.3.1 Synthesize accumulated intelligence	3.7.5.3 Intuitive comparison	5.9 Issue final plan
2.1 Conduct mission analysis	2.1.3.11 Develop own criteria for success	3.3.2 Determine advantages/disadvantages to enemy for each COA	3.7.5.4 Wargaming	6.0 PLAN REVIEW
2.1.1 Review situation	2.1.3.12 Develop own battlespace effects	3.3.3 Deduce enemy COAs (most likely and most dangerous at minimum)	3.7.5.5 Gather tools, materials and data	6.1 Conduct progress review of operation
2.1.1.1 Review environmental factors	2.1.4 Develop mission statement	3.4 Develop initial own COAs	3.7.5.6 List critical events and decision points	6.2 Conduct periodic OPLAN/CONPLAN review
2.1.1.2 Review political factors	2.1.5 Prepare mission analysis brief	3.4.1 Develop way to accomplish tasks associated with mission	3.7.5.7 Determine evaluation criteria	6.3 Conduct detailed exercise / wargaming
2.1.1.3 Review geographic factors	2.1.5.1 Summarize directives	3.4.2 Integrate and synchronize ideas in terms of principles of joint warfare	3.7.5.8 Select wargame method	6.4 Reinitiate OPP as required
2.1.1.4 Review enemy forces	2.1.5.2 Summarize decisions	3.4.3 Ensure focus of COGs is maintained	3.7.5.9 Select method to record and display results	6.5 Update and issue amendments as required
				6.6 Prepare and issue plans as required

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(U) This work compared the Canadian Forces (CF) Operational Planning Process (OPP) as it is applied by a Staff at the Brigade level in a realistic scenario with the OPP as it is prescribed in current doctrine and taught within the Land Force (Bruyn, Lamoureux and Vokac, 2004). To establish how the OPP is applied in an operational context, the planning Staff of 1 CMBG was observed during EX VIRTUAL RAM at Canadian Forces Base (CFB) Edmonton from Jan 21–25, 2005. Previous work has documented the OPP as it is outlined in doctrine and taught within the Land Force.

Overall, it was observed that not all the functions of the OPP as described in doctrine were performed during the exercise, and there was a great deal of 'looping' back and forth between the functions, mainly at the lower levels of the function decomposition. The abbreviation and repetition of lower level functions, seemingly in groupings, suggests that these functions are strongly linked and performed as more of a continual process than discrete steps. As well, it was observed that the planning process is indeed "command-driven" as the Commander makes the majority of critical decisions and provides significant guidance and direction to the remaining critical decisions handled by the planning Staff.

It was concluded that the 1 CMBG planning Staff followed a step-by-step analytical decision making approach for higher level OPP functions, but more intuitive processes to perform specific, individual functions. It appeared that the input of various staff to the OPP was intuitive, or at least based on his/her own estimate of the situation, compiled from various sources. These results suggest that, in general, application of the OPP at the Brigade level may be a hybrid of analytic and intuitive decision making.

(U) Dans le cadre de ce travail, nous avons comparé le processus de planification opérationnelle (PPO) des Forces canadiennes (FC), tel qu'il est appliqué par le personnel au niveau de la brigade dans un scénario réaliste, avec le PPO, tel que prévu par la doctrine actuelle et enseigné par la Force terrestre (Bruyn, Lamoureux et Vokac, 2004). Pour établir de quelle façon le PPO est mis en œuvre dans un contexte opérationnel, nous avons observé le personnel de planification du 1er Groupe?brigade mécanisé du Canada (1 GBMC) au cours de l'exercice Virtual Ram à la Base des Forces canadiennes Edmonton, du 21 au 25 janvier 2005. Des travaux antérieurs ont documenté le PPO tel que décrit dans la doctrine et enseigné par la Force terrestre.

Dans l'ensemble, nous avons remarqué que les fonctions du PPO, telles que décrites dans la doctrine, n'étaient pas toutes effectuées au cours de l'exercice et qu'il y avait beaucoup de va-et-vient, de « boucles » entre les fonctions, principalement aux niveaux inférieurs de la fonction décomposée. L'abrègement et la répétition des fonctions inférieures, vraisemblablement en groupes, donnent à penser que ces fonctions sont étroitement liées et effectuées de façon continue plutôt que par étapes. Nous avons également noté que le processus de planification relève du « commandement », étant donné que le commandant prend la majorité des décisions critiques et qu'il oriente et dirige de façon importante le reste des décisions critiques prises par le personnel de planification.

Nous avons conclu que le personnel de planification du 1 GBMC suivait une démarche décisionnelle analytique, étape par étape, pour les fonctions du PPO de niveau supérieur alors que les fonctions individuelles particulières étaient effectuées selon un processus plus intuitif. Il apparaît que l'apport des différents membres du personnel du PPO était d'un ordre plus intuitif, ou du moins fondé sur une évaluation personnelle de la situation, compilée à partir de différentes sources. Ces résultats donnent à penser qu'en général, la mise en œuvre du PPO au niveau de la brigade est un hybride de prises de décision intuitives et analytiques.

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(U) Operational Planning Process; decision making; Canadian Forces

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